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REGISTER

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REGISTER

OF THE

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OF

THE LEHIGH UNIVERSITY,

SOUTH BETHLEHEM, PENN'A,

FOR THE YEAR 1878-79,

WITH THE PLAN OF ORGANIZATION AND COURSE OF INSTRUCTION.

TUITION FREE.

FOUNDED BY ASA PACKER.

BETHLEHEM, PA.:
D. J. GODSHALK & CO., PRINTERS.
1879.

CALENDAR.

1878-79.

1878.		
Sept. 4.	First Term begins	Wednesday.
Nov. 28.	Thanksgiving Day	Thursday.
Dec. 21.	First Term ends	Saturday.
1879.		
Jan. 11.	Second Term begins	Saturday.
Feb. 22.	Washington's Birthday	Saturday.
Feb. 26.	Ash Wednesday	
April 10.	Easter Holidays begin	Thursday.
April 14.	Easter Holidays end	Monday.
June 6.	Annual Examination begins	Friday.
June 13-14.	Examinations for Admission	Friday and Saturday.
June 15.	University Sermon	Sunday.
June 18.	Reading of Theses	Wednesday.
June 19.	University Day	Thursday.

1879-80.

1879.		
Sept. 1-2.	Examinations for Admission	Monday and Tuesday.
Sept. 3.	First Term begins	Wednesday.
Nov. 25.	Thanksgiving Day	Thursday.
Dec. 22.	First Term ends	Monday.
1880.		
Jan. 12.	Second Term begins	Monday.

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The Lehigh University.

ORIGIN.

The Hon. Asa Packer of Mauch Chunk, during the year 1865, appropriated the sum of Five Hundred Thousand Dollars, to which he has since added one hundred and fifteen acres of land in South Bethlehem, to establish an educational institution in the rich and beautiful Valley of the Lehigh. From this foundation rose The Lehigh University.

DESIGN.

The original object of Judge Packer was to afford the young men of the Valley a complete technical education for those professions which had developed the peculiar resources of the surrounding region. Instruction was to be liberally provided in Civil, Mechanical and Mining Engineering; Chemistry, Metallurgy and Construction, and in all needful collateral studies. French and German were made important elements in the collegiate course. A School of General Literature was a part of the original plan, together with tuition in the ancient Classics, while the Institution was freely opened to pupils from every part of the country and the world.

It is proposed, as soon as practicable, to establish various other technical professorships, and at the same time to develop and enlarge the Classical Department, and to have all the appointments of a complete University.

FREE TUITION.

It will be observed that all these educational facilities are provided without charge. Through the generosity of the Founder, the Trustees were enabled, in 1871, to declare tuition FREE in all branches and classes. The Lehigh University is open to young men of suitable talents and training from every part of our own land and of the world. We specially call to this fact the attention of the pupils of our public schools and of the graduates of classical institutions. Thus is offered, *without charge*, every facility for mastering the professions of the Civil, Mechanical and Mining Engineer, and of the Metallurgist and Analytical Chemist. In the Classical and Scientific departments of the School of General Literature instruction is given to those who wish to become Lawyers, Clergymen, Physicians, Editors, or Merchants.

PUBLIC WORSHIP.

Prayers are attended in the Chapel every morning, and all the students are required to be present.

Divine Service is held on every Sunday morning, according to the forms of the Protestant Episcopal Church, in the Chapel of the University. Attendance at this service is required of every student, except in case of those connected with other religious bodies, to whom the President will grant permission at the beginning of each term (if requested by the parent or guardian, or by the student himself if he be 21 years of age) to attend during that term the place of worship of the body with which he is connected, where attendance on Sunday morning will in such cases be required.

SITE.

Nothing is wanting in the situation of the Institution. The salubrity of the climate and the beauty of the scenery cannot be surpassed. Situated in a region famous for its vast railway and manufacturing enterprises, near some of the richest iron and coal mines in our land, accessible to the great mechanical works of New York and Philadelphia, the students have rare facilities for confirming the teachings of the recitation room by the observation of the eye.

COMMUNICATIONS.

The University Buildings are about a half-mile from the depot, at the junction of the Lehigh Valley and North Pennsylvania Railroads, thus affording communication with all sections of the country. New York is about ninety, and Philadelphia fifty-four miles distant.

BUILDINGS.

Packer Hall, named after the Founder, stands seven hundred feet back of Packer Avenue, at the base of the Lehigh Mountain. Built of handsome stone, it presents to the north a noble and imposing front. At the western extremity is a belfry tower containing the President's Room and the Archive Room. The eastern end is a large advanced wing in which are Lecture and Recitation Rooms, and also a thoroughly equipped Chemical Laboratory. The central portion, eighty feet long, contains the Chapel, Drawing Room and Cabinets. To the east of Packer Hall stands the University Library, erected by the Founder in memory of Mrs. Lucy Packer Linderman his daughter. To the west, within the grounds, are the houses of the President and Professors, comporting architecturally with Packer Hall. Towards the northeastern extremity stand Christmas Hall and Saucon Hall, commodious brick edifices, containing students' rooms, heated by steam and lighted by gas, and a mess hall. At the southwestern extremity stands the Sayre Observatory, the gift of Robert H. Sayre, Esq., of South Bethlehem, containing an Equatorial and Zenith Telescope, Transit Instruments and Astronomical Clock.

EXPENSES.

As before stated, tuition is FREE in all branches and classes. Books, materials, paper, pencils, chemical materials used in the analytical laboratory, and instruments, are furnished by the student.

Rooms and board are provided in the University buildings, under the following rules:

1. The amount of room-rent, board, &c., for each term, must be paid in advance to the Treasurer of the Executive Committee, who will furnish the student with board ticket and key of room.

2. The charge for board and room-rent shall be $5 per week. Where two students occupy a room jointly, the charge shall be $4.50 per week for each.

3. The charge for board without room shall be $4 per week. The charge for room-rent without board shall be $2 per week for each room.

4. These prices include gas and heat.

5. Meal tickets will be furnished by the steward to students or friends visiting them, at 50 cents each, payable in advance to the steward.

6. The choice of rooms shall be in the order of the classes; in any class the first applicant to have the first choice.

7. Students may retain their rooms from year to year by giving notice of their intention so to do at the close of the academic year, and by procuring their tickets therefor on or before the first day of the next term.

8. Students are required to keep their rooms in order, or to employ some proper person to do so for them.

9. No furniture for rooms will be provided by the University.

10. The use of kerosene, coal oil or burning fluid, in any of the buildings, is prohibited.

NOTE.—Where clubs are formed the expenses of the student need not exceed $3.50 per week.

DIPLOMAS AND CERTIFICATES.

The Diploma is given only to those who have passed examinations in a regular course in the classes and in one of the Schools. For all partial courses a certificate is given of what the student has accomplished.

POSTGRADUATE DEGREES.

M. A.

The Faculty will recommend for the Degree of Master of Arts, candidates otherwise properly qualified, who, after taking the Degree of Bachelor of Arts, shall pursue for at least two years, at the University, a course of liberal study approved by the Faculty, pass a thorough examination on the same, and present satisfactory theses.

Ph. D.

The Faculty will recommend for the Degree of Doctor of Philosophy candidates, otherwise properly qualified, who, after taking either of

the Degrees of Civil, Mechanical or Mining Engineer, or Analytical Chemist, shall pursue, for two years, at the University, a course of advanced Scientific study in the line of their profession, pass a thorough examination in the same, and present satisfactory theses.

D. Sc.

The Faculty will recommend for the Degree of Doctor of Science, candidates otherwise properly qualified, who after taking the Degree of Bachelor of Science, shall pursue for at least two years, at the University, a course of Scientific study, embracing two subjects approved by the Faculty, pass a thorough examination, showing in one of the subjects special attainments, and shall present satisfactory theses, based upon an original scientific investigation.

The requirement of residence may be omitted in special cases by the Faculty.

The fee for either of these Diplomas is $10, payable before receiving it.

ADMISSION OF STUDENTS.

Application for admission into the University should be made to the President, from whom all information may be obtained.

REGULAR STUDENTS.

All applicants for regular standing in the classes or schools must be prepared to pass an examination according to the programme of studies. From this it will be seen that a student may be admitted at any time if able to pass a satisfactory examination in the studies already pursued by his class. The only exception will be in the case of any young man who is very nearly but not thoroughly prepared to enter in full standing in any class. Such an one may, at the discretion of the Faculty, be admitted conditionally, to make up his deficiencies by extra study under their direction. When they are made up, he will be received in full standing in his class.

SPECIAL STUDENTS

May enter, selecting such studies as they please, upon a satisfactory examination, with the sanction of the Faculty.

REQUIREMENTS FOR ADMISSION.

Applicants for admission into the first class must be at least *sixteen* years of age, and must present testimonials of good moral character.

SCHOOL OF GENERAL LITERATURE.

CLASSICAL COURSE.

Mathematics.—Arithmetic complete, including the Metric System, Olney's complete School Algebra, or Davies' new Bourdon's Algebra, through equations of the second degree. Chauvenet's Geometry, six books.

English.—Correct Spelling, to be determined by writing from dictation in idiomatic English. Geography. English Grammar. Physical Geography.

Latin.—A thorough knowledge of Latin Grammar. Cæsar's Commentaries, four books. Virgil's Æneid, four books. Cicero's four Orations against Catiline.

Greek.—A thorough knowledge of Greek Grammar is required. Xenophon's Anabasis, four books. Homer's Iliad, four books.

SCIENTIFIC COURSE AND THE TECHNICAL COURSE IN CIVIL, MECHANICAL AND MINING ENGINEERING, METALLURGY AND CHEMISTRY.

Mathematics.—Arithmetic complete, including metric system. Olney's complete School Algebra, or Davies' new Bourdon's Algebra, through equations of the second degree; first six books of Chauvenet's Geometry.

English.—Correct spelling, to be determined by writing from dictation in idiomatic English. Mitchell's School Geography. Parker's English Grammar. Mitchell's or Guyot's Physical Geography, or equivalent.

PROGRAMME OF STUDIES.

SHOWING THE NUMBER OF HOURS AND EXERCISES PER WEEK FOR EACH SUBJECT, AND THE TEXT-BOOKS USED.

The following is presented as the general programme of instruction, subject to such modifications from time to time as the Faculty may deem expedient, with the approval of the Trustees.

The names of the Authors studied are also given. The number of Exercises per week in each subject is indicated by the figure in parenthesis immediately following.

Two hours of Drawing, three of work in the Laboratory, or three of practice in the field are regarded as equivalent to a recitation or lecture of one hour's duration.

THE SCHOOL OF GENERAL LITERATURE.

This school is intended to correspond, with some important differences, to the course long established in our older colleges, modified by the needs and requirements of modern culture. Its object is to impart a comprehensive and liberal education to those who design to enter upon professional rather than technical studies.

It comprises two distinct but parallel courses: I. The Classical Course. II. The Course in General Science.

THE CLASSICAL COURSE.

This school is chiefly designed for those who propose to study Law, and Theology; it includes full and vigorous instruction in the Ancient Classics, in Elementary Science and in General Literature. The study of Mathematics in this course embraces Algebra, Geometry, Trigonometry, Descriptive and Anlaytical Geometry, and the Calculus. The programme includes Physics, Chemistry and Elementary Mechanics. There are also full courses in History, in the Science of language and in the origin and growth of the English Language. There are also lectures on Psychology, the Christian Evidences, International and Constitutional Law and Political Economy. Lectures on English Literature are supplemented by critical readings of the standard English authors. Successful study in this course leads to the degree of B. A. (Bachelor of Arts).

THE COURSE IN GENERAL SCIENCE.

This course comprises most of the studies of the Classical Course, and is chiefly intended for those who, from circumstance or inclination, do not desire to study Latin and Greek. These being omitted, more extended instruction is given in French and German.

More time is also given to General Science. The instruction given in this Course, will be particularly valuable to those who design to enter upon commercial pursuits, or matters of general industry. The degree of B. Sc. (Bachelor of Science) is conferred upon the graduate in this course.

CLASSICAL COURSE.

FRESHMAN CLASS.

FIRST TERM.

Latin.—Livy: Books XXI. and XXII. Horace: Odes. (4)
Greek.—Herodotus' Persian Wars, or Homer's Odyssey. Classic Mythology. (4)
History.—Weber's Outlines of History. (2)
Mathematics.—Chauvenet's Geometry (completed). (4)
Essays and Declamations. (1)
Drawing. (1)

SECOND TERM.

Latin.—Cicero: De Senectute and deAmicitia. Latin Prosody. (4)
Greek.—Xenophon's Memorabilia of Socrates, or Cyropædia. Greek and Roman Antiquities. (4)
History.—Weber's Outlines of History. (2)
Mathematics.—Olney's University Algebra, Part III. (5)
Essays and Declamations. (1)

SOPHOMORE CLASS.

FIRST TERM.

Latin.—Tacitus ; Agricola. (3)
Greek.—Demosthenes' Philippics, or the Universal History of Polybius. (4)
English.—Coppée's English Literature. (4)
Mathematics.—Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables: Olney's General Geometry. (4)
Essays and Original Orations. (1)

Latin.—Horace: Satires and Epistles. (4)
Greek.—Euripides: Medea or Alcestis. (3)
Rhetoric.—Coppée's Rhetoric. (2)
English.—Lectures on the Science of Language: Müller and Farrar. (2)
Mathematics.—Differential and Integral Calculus. Courtenay. (4)
Essays and Original Orations. (1)

JUNIOR CLASS.

FIRST TERM.

Latin.—Tacitus: Annals. (2)
Greek.—Plato's Gorgias. (2)
History.—Lectures. (4)
Logic.—Coppée's Logic. (3)
Fine Arts.—Lectures. (1)
Physics.—Deschanel's Mechanics and Lectures, with Laboratory Practice. (2)
Anatomy and Physiology.—Lectures. (1)

SECOND TERM.

Latin.—Satires of Juvenal. (2)
Greek.—Thucydides. (2)
History.—Lectures on the Philosophy of History. (2)
English.—Lectures on the English Language: Schele deVere. (1)
Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)
Physics.—Galvanism, Acoustics, Light. Deschanel with Lectures and Laboratory Practice. (5)

SENIOR CLASS.

FIRST TERM.

Latin.—Horace: Ars Poetica, or the Adelphi of Terence. (2)
Greek —Theocritus. (2)
Psychology.—Lectures. (1)
International Law and History.—Lectures. (1)
English Literature and History.—Lectures. (3)

Descriptive Astronomy.—Loomis Treatise, with Lectures. (3)

Physics.—Heat, Meteorology, Barometrical Leveling and Measurement of Heights, Magnetism and Statical Electricity. Lectures with Laboratory Practice. (3)

SECOND TERM.

Latin.—Cicero de Officiis. (3)

Greek.—Demosthenes' and Æschines de Corona, or Æschylus' Prometheus Vinctus. (2)

Psychology and Christian Evidences.—Lectures. (2)

Political Economy.—Lectures. (1)

Constitutional Law and History.—Lectures. (2)

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (3)

Geology.—Lectures. Dana. (2)

Preparation of Thesis.

SCIENTIFIC COURSE.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Chauvenet's Geometry, (completed). (4)

French.—Fasquelle's Introductory French Course. Gibert's second French Reader. (3)

German.—Otto's Grammar. Writing in German Text. Translation into English. (4)

History.—Weber's Outlines of History. (2)

Elementary Drawing. (2)

Essays and Declamations.. (1)

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. (5)

French.—Languillier's and Monsanto's Practical French Course. Chouquet's first Readings from Modern French Writers. (3)

German.—Otto's Grammar. Schlegel's second Classical German Reader. (2)

History.—Weber's Outlines of History. (2)

Drawing. (3)

Essays and Declamations. (1)

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. Olney's General Geometry. (4)

French.—Languillier's and Monsanto's Practical French Course. Chouquet's First Readings from Modern French writers. Practical Exercises in Translation from French into English. (3)

German.—Otto's German Grammar. Schlegel's Second Classical Reader. Practical Exercises in Translation from German into English. (3)

English.—Coppée's English Literature. (4)

Drawing. (1)

Essays and Original Orations. (1)

SECOND TERM.

Mathematics.—Differential and Integral Calculus. Courtenay's. (4)

Descriptive Geometry.—General Orthographic Projections. Isometric Drawing. Warren's. (3)

French.—Poitevin: Grammaire Élémentaire, in French. Written Exercises. Chapsal: Leçons et Modèles de Littérature Française. (2)

German.—Scientific Readings. Exercises. (2)

Rhetoric.—Coppée's Rhetoric. (2)

English.—Lectures on the Science of Language. Müller and Farrar. (2)

Essays and Original Orations. (1)

JUNIOR CLASS.

FIRST TERM.

Physics.—Deschanel's Mechanics and Lectures, with Laboratory Practice. (2)

Anatomy and Physiology.—Lectures. (1)

French.—Poitevin, continued with Exercises. Systematic Scientific Readings. Chapsal continued. (2)

German.—Systematic Scientific Readings. Translatiom from German into English. Compositions in German. (2)

History.—Lectures. (4)

Logic.—Coppée's Logic. (3)

Fine Arts.—Lectures. (1)

SECOND TERM.

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

Physics.—Galvanism. Acoustics. Light. Deschanel, with Lectures and Laboratory Practice. (5)

French.—Systematic Readings. Composition. Bougeault: Précis de la Littérature Française. (2)

German.—Systematic Scientific Readings. Composition. Translations. Lectures on German Literature. (2)

History.—Lectures on the Philosophy of History. (2)

English. – Lectures on the English Language. Schele deVere. (1)

SENIOR CLASS.

FIRST TERM.

Physics.—Deschanel's Heat, Magnetism and Statical Electricity. Barometrical Leveling and Measurement of Heights. Lectures, with Laboratory Practice. (3)

Descriptive Astronomy.—Loomis' Treatise, with Lectures. (3)

Surveying.— Gillespie's Surveying. (2)

Crystallography.—Lectures with Practical Exercises in the Determination of Crystals. (2)

Psycholgy.—Lectures. (1)

International Law.—Lectures. (1)

English Literature and History.—Lectures. (3)

SECOND TERM.

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (5)

Mineralogy.—Descriptive and Determinative, with Practice. E. S. Dana. (3)

Geology.—Lectures. Dana's Treatise. (2)

Psychology and Christian Evidences.—Lectures. (2)

Political Economy.—Lectures. (1)

Constitutional Law and History.—Lectures. (2)

Preparation of Thesis.

TECHNICAL COURSES.

The first three terms (one year and a half) have the same curriculum of studies for all the Technical Schools. At the end of that time the student selects his course and follows the programme laid down for the School selected.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Chauvenet's Geometry, (completed). (4)

Physics.—Deschanel's Mechanics and Lectures. With Laboratory Practice. (2)

French.—Fasquelle's Introductory French Course. Gibert's second French Reader. (3)

German.—Otto's Grammar. Writing in German Text. Translation of German into English. (4)

Elementary Drawing.—Warren. (2)

Essays and Declamations. (1)

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. (5)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

French.—Languillier's and Monsanto's Practical French Course. Chouquet's first Readings from Modern French Writers. (3)

German.—Otto's Grammar. Schlegel's second Classical German Reader. (2)

Drawing.—Warren's Projection Drawing. (2)

Essays and Declamations. (1)

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. Olney's General Geometry. (4)

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (5)

Physics.—Heat, Meteorology, Barometrical Leveling and Measurement of Heights, Magnetism and Statical Electricity. Lectures, with Laboratory Practice. (3)

French or German.—As in the Scientific Course of the School of General Literature. (3)

Essays and Original Orations. (1)

THE SCHOOL OF CIVIL ENGINEERING.

The general scope of this School comprises the higher branches of the applied mechanics and mathematics, together with the principles of construction and exercises in mapping, drawing and designing. Thus, the student is made acquainted with the Theory of Elasticity or Flexure, including the strength of materials, the principles of construction of roof-trusses, beams, girders and bridges, as well as the practical designing of such structures, the determination of their proper dimensions and the preparation of working drawings. Under this head belongs also the Theory of the Stability of Structures, including the theory of the arch and the construction of retaining walls; together with the Theory of Motion as applied to machines, the principles of Hydrostatics and Hydraulics with their applications to water-pressure engines, vertical water wheels and turbines.

In all cases, practical examples, such as occur in actual engineering practice, are taken up and discussed, and, together with the analytical or algebraic methods, the student is also instructed in practical graphical solutions of the various problems, wherever such solutions present a special value in practice. Much time is devoted to surveying operations and to actual practice in the field. Profiles, Plans of Topographical Surveys, Contour Maps, and Railroad Charts, are made. The practical operations connected with the reconnoissance, location and surveys of roads, canals and railroads, such as cross sectioning, setting grade stakes, laying out of curves and calculation of excavation and embankment, are fully illustrated in the field. Thorough instruction is given in Drawing, the construction of working drawings of structures, the designing of bridges and roofs, topography and hydrographical charts.

Attention is also paid to the application of the general principles of the science of Engineering, or to Engineering considered as an

art. Under this latter head may be classed the composition and qualities of materials used in construction, iron, steel, wood, stone; their dressing and preservation; foundations, earth and rock-work; harbor and river improvements, drainage, collection and distribution of water.

So much of Mechanical Engineering is necessarily included, as refers to the construction of bridges, and the special machinery and appliances used in the erection of structures.

Designs for, and reviews of, special structures, specifications and estimates of quantities and cost, and the preparation of a graduation Thesis giving evidence of satisfactory attainments, complete the course. The graduate of this School will receive the degree of C. E. (Civil Engineer.)

Graduates of the School of Civil Engineering, by remaining one year and pursuing one of the courses of studies elsewhere laid down may receive the degree of M. E. (Mechanical Engineer) or E. M. (Engineer of Mines.)

SCHOOL OF CIVIL ENGINEERING.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus. Courtenay. (4)

Descriptive Geometry.—General Orthographic Projections. Isometric Drawing. Warren. (3)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys Profiles. Contour Maps. Gillespie. (3)

Construction.—Civil Engineering. Mahan. (1)

Physics.—Galvanism. Acoustics. Light. Deschanel with Lectures and Laboratory Practice. (5)

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus. Courtenay. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in General. Statics. Dynamics and Statics of Fluids. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Descriptive Geometry.—Warped Surfaces. Shades and Shadows. Linear Perspective. Warren. (3)

Surveying.—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. Smith. (5)

Crystallography.—Lectures. (1)

SECOND TERM.

Applied Mechanics.—Resistance of Materials. Theory of Flexure. Wood. DuBois' Weyrauch. (3)

Kinematics.—Principles of Mechanism. Willis. (3)

Stereotomy.—Stone Cutting. Machine Drawing. Working Drawings. Warren. (3)

Surveying.—Mine Surveying. Road and Railroad Surveying. Location of a Railroad Line. Profile, Map and Estimate of Cost. Gillespie. Henck. (3)

Mineralogy.—Descriptive and Determinative, with Practice. E. S. Dana. (3)

Construction.—Die Brücken in Eisen.—Heinzerling. Visits of Inspection. (1)

SENIOR CLASS.

FIRST TERM.

Applied Mechanics.—Theory of Retaining Walls, Arches, Roofs and Bridges. Graphical Statics. (5)

Construction.—Principles of Construction. Erection of Structures. Reports on and Designs for Simple Structures. Visits of Inspection. (3)

Surveying.—Hydrography and Geodesy. (2)

Astronomy.—Descriptive Astronomy. Loomis. (3)

Psychology.—Lectures by the President. (1)

English Literature and History.—Lectures. (2)

SECOND TERM.

Applied Mechanics.—Hydraulics and Hydraulic Motors. Steam and Steam Engines. Weisbach. (5)

Construction.—Specifications and Contracts. Original Designs and Estimates for Engineering Projects. Visits of Inspection. (5)

Astronomy.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory work. Determination of Latitude, Longtitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescope. (2)

Geology.—Lectures. Dana. (2)

Psychology and Christian Evidences.—Lectures by the President. (2)

Preparation of Theses.

POST GRADUATE COURSE FOR MECHANICAL ENGINEERS FOR THE DEGREE OF CIVIL ENGINEER.

FIRST TERM.

Surveying.—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. Smith. (5)

Construction.—Principles of Construction. Erection of Structures. Reports on and Designs for Simple Structures. (3)

Surveying.—Hydrography and Geodesy. (2)

SECOND TERM.

Stereotomy.—Stone Cutting. (2)

Surveying.—Mine Surveying. Road and Railroad Surveying. Location of a Railroad Line. Profile, Map and Estimate of Cost. Gillespie and Henck. (3)

Construction.—Original Designs and Estimates for Engineering Projects. (3)

Astronomy.—Practical Astronomy as Applied to Geodesy and Navigation. Lectures and Observatory Work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescope. (2)

Preparation of Theses.

THE SCHOOL OF MECHANICAL ENGINEERING.

While the problems which the Civil Engineer is called upon to solve are mainly statical problems, involving the idea of rest or equilibrium, and the ends to be obtained in his constructions are stiffness, rigidity and immobility; the object of the Mechanical or Dynamical Engineer, on the other hand, is not to avoid or prevent,

but to cause motion, not to oppose the action of the forces of nature, but so to guide and use them as to obtain the desired results in the best manner and with the least expenditure of force and material. The two professions are thus, in the nature of the problem with which they have to do, to a certain extent antithetical. The sciences, however, of which both make use, and the fundamental principles, by the application of which the desired results are in each case obtained, are, to a considerable extent, identical.

Thus, the higher branches of the mathematics and of applied mechanics, as well as the principles of constructions, are common to both Schools. So also as regards the Theory of Elasticity or Flexure and the Strength and Properties of Materials. Much, therefore, of the course as already indicated for the School of Civil Engineering, finds here also a place, as will appear from an examination of the more detailed course of study given below.

In the practical application of the principles common to both, however, the two Schools diverge. Thus special attention is directed to the applications of the principles of mechanics to machinery, in the construction of stationary, locomotive and marine engines, hydraulic motors of various kinds, blast furnaces and their appurtenances, foundries, rolling mills and steel works. Information is afforded of the methods of casting and working in iron and other metals, and of making and using the tools employed in these processes.

Much attention is paid to the execution of working drawings, and to the Theory of Mechanism. The proximity of numerous blast furnaces, rolling mills, foundries, machine shops and factories, enables the student to see the practical workings of such establishments and to obtain valuable practical information in the various branches of mechanical engineering.

Visits of inspection to the workshops, mills and blast furnaces in the neighborhood, with explanations of the machinery and tools used, form an important feature of the course.

The graduate in this School will receive the degree of M. E. (Mechanical Engineer.)

Graduates of the School of Mechanical Engineering, by remaining an additional year and pursuing the course of studies elsewhere laid down, may receive the degree of C. E. (Civil Engineer.)

THE SCHOOL OF MECHANICAL ENGINEERING.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus. Courtenay. (4)

Descriptive Geometry.—General Orthographic Projections. Isometric Drawing. Warren. (3)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles. Contour Maps. Gillespie. (3)

Physics.—Galvanism. Acoustics. Light. Deschanel, with Lectures and Laboratory Practice. (5)

Blow-Pipe Analysis.—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus. Courtenay. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Descriptive Geometry.—Warped Surfaces. Shades and Shadows. Linear Perspective. Warren. (3)

Stereotomy.—Elements of Machine Drawing. Working Drawings. (3)

Construction.—Pattern Making, Moulding and Casting. Visits of Inspection. Rose. (2)

Crystallography.—Lectures. (1)

SECOND TERM.

Applied Mechanics.—Resistance of Materials. Theory of Flexure. Wood. DuBois' Weyrauch. (3)

Kinematics.—Principles of Mechanism. Willis. (3)

Machine Drawing.—Working Drawings of Machinery. Elements of Machine Designs. Sketches of Machines. (3)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

Construction.—Die Brücken in Eisen.—Heinzerling. Visits of Inspection. (1)

SENIOR CLASS.

FIRST TERM.

Applied Mechanics.—Theory of Retaining Walls, Arches, Roofs and Bridges. Graphical Statics. (5)

Construction.—Forging and Riveting. Workshop Appliances and Processes. Reports on and Designs for Simple Machines. Visits of Inspection. (3)

Thermodynamics.—Theory of Heat. Shann. (2)

Astronomy.—Descriptive Astronomy. Loomis. (3)

Psychology.—Lectures by the President. (1)

English Literature and History.—Lectures. (2)

SECOND TERM.

Applied Mechanics.—Hydraulics and Hydraulic Motors. Steam and the Steam Engine. Weisbach. (5)

Kinematics.—Link and Valve Motion. Zeuner. (2)

Construction.—Specifications and Contracts. Original Designs and Estimates for Machines. Visits of Inspection. (5)

Geology.—Lectures. Dana. (2)

Psychology and Christian Evidences.—Lectures by the President. (2)

Preparation of Theses.

POST GRADUATE COURSE FOR CIVIL ENGINEERS FOR THE DEGREE OF MECHANICAL ENGINEER.

FIRST TERM.

Stereotomy.—Elements of Machine Drawing. Working Drawings. (3)

Construction.—Pattern Making, Moulding and Casting. Forging and Riveting. Workshop Appliances and Processes. Reports on and Designs for Simple Machines. (5)

Thermodynamics.—Theory of Heat. Shann. (2)

SECOND TERM.

Kinematics.—Link and Valve Motion. Zeuner. (2)

Machine Drawing.—Elements of Machine Designs. Sketches of Machines. Working Drawings. (2)

Construction.—Original Designs and Estimates for Machines. (3)

Metallurgy.—Metallurgical Processes, Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Preparation of Theses.

THE SCHOOL OF MINING AND METALLURGY.

The full course in this School comprises, besides the Mathematical, Physical, Chemical and Literary studies necessary to all technical education, courses in Mining, Metallurgy, Geology, Mineralogy, Machines, qualitative and quantitative Analysis, Assaying, Blow-pipe Analysis, Topographical and Mine Surveying and Drawing. On account of the great number and scope of the studies necessary to the completion of the full course, it is four years and a half in length.

The graduate in this School, who has taken the full course, will receive the degree of E. M. (Engineer of Mines.)

A partial course may be taken in this School by those who wish to pursue the study of Metallurgy. The course of Metallurgy includes the studies of the full course, except those of Mining and Surveying. The length of the course is four years.

The graduate of this School in the Metallurgical course will receive the degree of Metallt. (Metallurgist.)

A Post Graduate course has been arranged in this School, comprising courses in Mining, Metallurgy, Chemical Analysis and Blow-pipe Analysis, with supplementary courses in Geology and Mineralogy.

Graduates in the School of Civil Engineering, by remaining one year and taking this course, may obtain the degree of E. M.

In the courses of Mineralogy, Geology and Analytical Chemistry, much attention is paid to the practical instruction of the student in determining minerals by their crystallographical and physical

properties, and by the aid of blow-pipe analysis, in the determination of rocks; in the qualitative and quantitative examination of ores and metallurgical products and in the rapid methods of assaying ores by the dry and wet ways employed in metallurgical laboratories. The vicinity to the iron works of the Lehigh Valley and especially to the works of the Bethlehem Iron Company, with its blast furnaces, foundry and machine shops, and Bessemer, puddle, iron and steel rail mills, affords unusual facilities for the practical study of iron metallurgy. The processes of the manufacture of spelter and oxide of zinc may be studied at the works of the Lehigh Zinc Company. The facilities for the practical study of mining and economic geology are hardly less great. The mines of the Lehigh Zinc Company and the brown hematite and slate deposits of the Lehigh Valley are in the immediate vicinity, while within easy reach by rail are the anthracite coal fields of Pennsylvania, the iron and zinc mines of New Jersey, and the celebrated iron mines at Cornwall, Pa.

THE SCHOOL OF MINING AND METALLURGY.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus. Courtenay. (4)

Descriptive Geometry.—General Orthographic Projections. Isometric Drawing. Warren. (3)

Surveying —Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles. Contour Maps. Gillespie. (3)

Physics.—Galvanism, Acoustics and Light. Deschanel, with Lectures and Laboratory Practice. (5)

Blow-Pipe Analysis.—Lectures and Practice. Plattner, Brush or Nason and Chandler. (1)

JUNIOR CLASS.

FIRST TERM.

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Surveying.—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. Smith. (5)

Crystallography.—Lectures with Practical Exercises in the Determination of Crystals. (2)

Chemical Philosophy.—Cooke. (4)

SECOND TERM.

Surveying.—Mine Surveying. (1)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

Blow-Pipe Analysis.—Practice. (1)

Applied Mechanics.—Resistance of Materials. Theory of Flexure, Wood. DuBois' Weyrauch. (3)

Chemical Philosophy.—Cooke. (3)

Chemistry.—Quantitative Analysis. Laboratory Practice. (2)

SENIOR CLASS.

FIRST TERM.

Applied Mechanics.—Theory of Retaining Walls, Arches, Roofs and Bridges. (3)

Geology.—Lithology, with Practical Exercises in the Determination of Rocks. Lectures. (3)

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. Fresenius. (3)

Psychology.—(1)

Astronomy.—Descriptive Astronomy. Loomis. (3)

SECOND TERM.

Applied Mechanics.—Hydraulics and Hydraulic Motors. Steam and Steam Engines. Weisbach. (5)

Mining.—Modes of Occurrence of the Useful Minerals. Searching for Mineral Deposits. Examination of Mining Properties. Boring. Mining Tools, Machines and Processes. Timbering and Masonry. Methods of Exploitation. Callon. André. (3)

Geology.—Historic, Dynamic and Economic Geology. Dana. (3)

Astronomy.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory Work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescope. (2)

Psychology and Christian Evidences.—Lectures by the President. (2)

Assaying.—Including the Assay by the Dry Methods of Gold, Silver, Copper, Lead, Iron and Tin Ores. Laboratory Work. Ricketts. (1)

FIFTH YEAR.

FIRST TERM.

Mining.—Underground Transportation. Hoisting, Drainage and Pumping. Ventilation and Lighting. Mechanical Preparation of Ores. Coal Washing. Callon. André. (4)

Chemistry.—Quantitative Analysis. (7)

Psychology.—Lectures by the President. (1)

English Literature and History.—Lectures. (2)

Preparation of Theses.

METALLURGICAL COURSE.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus. Courtenay. (4)

Descriptive Geometry.—General Orthographic Projections. Warren. (3)

Physics.—Galvanism. Acoustics. Light. Deschanel, with Lectures and Laboratory Practice. (5)

Blow-Pipe Analysis.—Lectures with Practice. Plattner, Brush or Nason and Chandler. (1)

Assaying.—Including the Assay by the Dry Methods of Gold, Silver, Copper, Lead, Iron and Tin Ores. Laboratory Work. Ricketts. (1)

Structure Drawing.—Furnaces and Metallurgical Apparatus. (2)

JUNIOR CLASS.

FIRST TERM.

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Chemical Philosophy.—Cooke. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. Fresenius. (3)

Crystallography.—Lectures with Practical Exercises in the Determination of Crystals. (2)

Machine Drawing.—Elements of Machine Drawing. Working Drawings. (2)

SECOND TERM.

Applied Mechanics.—Resistance of Materials. Theory of Flexure. Wood. DuBois' Weyrauch. (3)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

Blow-Pipe Analysis.—Practice. (1)

Chemical Philosophy.—Cooke. (4)

Kinematics.—Principles of Mechanism. Willis. (3)

SENIOR CLASS.

FIRST TERM.

Applied Mechanics.—Theory of Retaining Walls, Arches, Roofs and Bridges. (3)

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. (3)

Geology.—Lithology, with Practical Exercises in the Determination of Rocks. Lectures. (3)

Psychology.—Lectures by the President. (1)

English Literature and History.—Lectures. (2)

SECOND TERM.

Applied Mechanics.—Hydraulics and Hydraulic Motors. Steam and the Steam Engine. Weisbach. (5)

Kinematics.—Link and Valve Motion. Zeuner. (2)

Chemistry.—Quantitative Analysis. Laboratory Work. (3)

Geology.—Historic, Dynamic and Economic Geology. Lectures. Dana. (3)

Psychology and Christian Evidences.—Lectures by the President. (2)

Preparation of Theses.

POST GRADUATE COURSE FOR CIVIL ENGINEERS FOR THE DEGREE OF MINING ENGINEER.

FIRST TERM.

Mining.—Underground Transportation. Hoisting. Drainage and Pumping. Ventilation and Lighting. Mechanical Preparation of Ores. Coal Washing. (4)

Geology.—Lithology, with Practical Exercises in the Determination of Rocks. Dana. (1)

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. (6)

Crystallography.—Practical Exercises in the Determination of Crystals. E. S. Dana. (1)

SECOND TERM.

Mining.—Modes of Occurrence of the Useful Minerals. Searching for Mineral Deposits. Examination of Mining Properties. Boring. Mining Tools, Machines and Processes. Timbering and Masonry. Methods of Exploitation. (4)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Geology.—Historic, Dynamic and Economic Geology. Dana. (3)

Chemistry.—Quantitative Analysis. Laboratory Work. (3)

Assaying.—Including the Assay by the Dry Methods of Gold, Silver, Copper, Lead, Iron and Tin Ores. Ricketts. (1)

Blow-Pipe Analysis.—Practice. (2)

THE SCHOOL OF CHEMISTRY.

The course of instruction in this School continues the subject of Theoretical Chemistry from the general course of the two previous terms, the subjects of Chemical Philosophy and Organic Chemistry being taught by daily recitations until the close of the Junior year.

In Analytical Chemistry, the course of Qualitative Analysis in the first term of the second year is followed by preparation of Chemical Compounds and the Purification of Chemicals.

Subsequently, Quantitative Analysis is pursued to the end of the course, including the Dry Assaying of Ores of Gold, Silver, Copper, Lead, Iron and Tin, and the Wet Analyses, included in the appended schedule. In addition, courses of Lectures on Medical, Agricultural and Technical Chemistry are given, and various industrial establishments in the neighborhood and in Philadelphia and New York are visited, in the company of an instructor. The course also includes thorough instruction in Physics and Mechanics, Mineralogy and Blow-Pipe Analysis, Metallurgy, Geology and Descriptive Astronomy.

The last term of the Senior year is mainly devoted to the preparation of a Thesis on some subject, selected by the Professor, involving practical work in the Laboratory, in addition to the literary labor, and each graduate will thus make a contribution to the progress of the science as a preliminary to the reception of his degree.

The course is thus seen to include thorough instruction in theoretical and applied chemistry, in their various branches, as well as in those cognate and other sciences of such great value to the chemist.

The Laboratories are under the immediate charge of the Professor and his Assistant, and, together with the Lecture-room, are unsurpassed in excellence by any similar establishment in the country, being supplied with all the modern improvements. The collections of apparatus, specimens and models, illustrating theoretical and applied chemistry, are already important and rapidly increasing.

Students are charged for the chemicals and apparatus consumed. If the student is moderately careful, this expense need not exceed $60 per year.

The graduate in this School will receive the degree of A. C. (Analytical Chemist.)

THE SCHOOL OF CHEMISTRY.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus. Courtenay. (4)

Descriptive Geometry.—General Orthographic Projections. Isometric Drawing. Warren. (3)

Physics.—Galvanism. Acoustics. Light. Deschanel, with Lectures and Laboratory Practice. (5)

Chemical Preparations.—Including the Preparation of Chemical Compounds and the Purification of Chemicals by Distillation, Sublimation, Fusion, Crystallization, Precipitation, etc. (1)

Assaying.—Including the Assay by the Dry Methods of Gold, Silver, Copper, Lead, Iron and Tin Ores. Ricketts. (1)

Blow-Pipe Analysis.—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

JUNIOR CLASS.

FIRST TERM.

Chemical Philosophy.—Cooke. (4)

Toxicology.—Otto on Poisons. (1)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (7)

The following analyses are executed by the students:

1. Iron Wire (Fe.)
2. Potassic Dichromate (Cr_2O_3.)
3. Baric Chloride (Ba. Cl. H_2O.)
4. Magnesic Sulphate (MgO. SO_3. H_2O.)
5. Hydro Di-Sodic Phosphate (P_2O_5.)
6. Bronze (Cu. Sn. Zn.)
7. Rochelle Salt (K_2O. Na_2O.)
8. Volumetric Determination of Chlorine.
9. Acidimetry (HCl. H_2SO_4. HNO_3.)
10. Alkalimetry (KOH. NaOH. NH_4OH.)
11. Chlorimetry (Bleaching Powders.)
12. Silver Coin (Au. Ag. Pb. Cu.)
13. Zinc Ore (Zn.)

Crystallography.—Lectures with Practical Exercises in the Determination of Crystals. (2)

Anatomy and Physiology.—Lectures. (1)

SECOND TERM.

Chemical Philosophy.—Cooke. (4)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (5)

The following analyses are executed by the students:

14. Copper Ore (Cu.)
15. Spiegeleisen (Mn.)
16. Lead Ore (Pb.S.)
17. Ilmenite (TiO_2.)
18. Iron Ore (Complete Analysis.)
19. Limestone (Complete Analysis.)
20. Coal (Volatile Matter,—Fixed Carbon, Ash, H_2O, S., P.)
21. Slag (Complete Analysis.)

Metallurgy.—Metallurgical Processes, Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

SENIOR CLASS.

FIRST TERM.

Organic Chemistry.—Wöhler. (4)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (5)

The following analyses are executed by the students:

22. Guano (NH_3. P_2O_5. H_2O.)
23. Clay (Complete Analysis.)
24. Manganese Ore (MnO_2.)
25. Mineral Water (Complete Analysis.)
26. Pig Iron (Complete Analysis.)
27. Nickel Ore (Ni. Co.)
28. Organic Analysis (C. H. O. N.)
29. Gas Analysis (Complete Analysis of Illuminating Gas.)

Astronomy.—Descriptive Astronomy. Loomis. (3)

Psychology.—Lectures by the President. (1)
English Literature and History.—Lectures. (2)

SECOND TERM.

Chemistry Applied to the Arts.—Lectures. (3)
Medical Chemistry.—Lectures. (1)
Agricultural Chemistry.—Lectures. (1)
Geology.—Historic, Dynamic and Economic Geology. Lectures. Dana. (2)
Psychology and Christian Evidences.—Lectures by the President. (2)
Preparation of Theses.

UNIVERSITY LAW LECTURES.

At the last meeting of the Board of Trustees, in accordance with the suggestion of the President, a committee was appointed to consider the expediency of a course of Law Lectures. After a full discussion the committee resolved to have such a course. Consequently, Gen. W. E. Doster was invited to lecture on "Practice in Pennsylvania," and Robt. E. Wright, Sr., Esq., on "The Law of Contracts." It was arranged that Dr. Coppée should deliver, as usual, his lectures on "International" and "Constitutional Law." Circulars were issued under the direction of the committee. The lectures began on the 3d of October, 1878. Twenty-four law-students from Easton, Allentown and Bethlehem matriculated, and these, with the members of the Senior Class, and persons casually attending, made it necessary to use the University Chapel. A "Moot Court" was organized, and held by the Hon. Henry Green and afterwards by Matthew Hale Jones, Esq., Gen. Doster, the Hon. Edward L. Dana and the President. The Hon. Ulysses Mercur, of the Supreme Court of Pennsylvania, presided on the 13th of February, when, in consequence of the resignation of Gen. Doster, the course was closed. The enterprise has been unexpectedly successful.

THE UNIVERSITY LIBRARY.

The Library Building was erected by the Founder of the University in 1877, at a cost of One Hundred Thousand Dollars, as a memorial of his daughter, Mrs. Lucy Packer Linderman, and during the

past year more than Twenty Thousand Dollars have been contributed by the family and friends of that estimable woman, as a memorial fund for the purchase of books.

The building is semi-circular in plan, with a handsome facade in the Venetian style of architecture. It is constructed of Potsdam sandstone with granite ornamentation. In the interior, the centre is occupied as a reading space, fifty by forty feet, from which radiate the book cases, extending from floor to ceiling; two galleries affording access to the upper cases. Shelf room is now provided for Eighty Thousand Volumes. The building is thoroughly fireproof, well lighted, and heated by steam.

During the past year ten thousand volumes have been placed upon the shelves, including many extremely valuable works. The list of periodicals numbers about fifty, embracing as far as possible all departments of knowledge.

The Library is conducted strictly for consultation, and is open to the use of the public; both of which conditions are in accord with the terms of the gift.

REGULATIONS OF THE LEHIGH UNIVERSITY LIBRARY.

I. The Library is open every day, except Sundays and Legal Holidays, from 8 A. M. until 9 P. M.

II. Admission is free to all persons over 16 years of age.

III. Readers are required to write their names and addresses in the Daily Register of the Library. They also write the name of the book desired upon a Library card, with their signatures, and present the same to the Director's Clerk, who supplies the book, retaining the card as a receipt. Before leaving the Library, readers return their books to the clerk and receive their cards.

IV. No book is permitted, under any circumstances, to be taken from the Library.

V. No person is allowed to enter the alcoves, or remove any book from the shelves, without the permission of the Director.

VI. Readers wishing to consult the more valuable illustrated works make special application for that purpose.

VII. In taking notes, pencils, and not pens and ink, are to be used.

VIII. Audible conversation and the use of tobacco are strictly forbidden in any part of the Library.

IX. Any person not conforming to these Regulations, will be denied the privileges of the Library.

X. Any person who defaces, in any way, any book, magazine or paper, or the furniture, or any portion of the building, in addition to being deprived of the privileges of the Library, will be prosecuted according to law.

OBSERVATORY.

By the liberality of Robert H. Sayre, Esq., one of the Trustees of the University, an Astronomical Observatory has been erected on the University grounds, and placed under the charge of the Professor of Mathematics and Astronomy.

In the dome of the observatory is mounted an Equatorial Telescope, of six inches aperture, by Alvan Clark & Sons. The west wing contains a superior Sidereal Clock, by Wm. Bond & Sons; a Zenith Telescope, by Blunt, and a Field Transit by Stackpole. There is also a Prismatic Sextant, by Pistor & Martins.

Students in practical Astronomy receive instruction in the use of the instruments and in actual observation.

The grounds upon which the observatory stands, consisting of seven acres of land adjoining the original grant, were presented to the University by Charles Brodhead, Esq., of Bethlehem.

An advanced course in Astronomy and the higher Analysis has been established, requiring two years for its completion.

It is adapted to the attainments of the graduates of this University, but is open to any one who may be prepared to pursue it.

This course embraces the following subjects:

First Year—Spherical Astronomy. Theory of Instruments. Method of Least Squares. Numerical Calculus.

Second Year—Celestial Mechanics. Interpolation and Quadrature. Computation of Orbits and Perturbations.

During the entire course, the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

SOCIETIES.

THE CHEMICAL AND NATURAL HISTORY SOCIETY OF THE LEHIGH UNIVERSITY.

This Society was organized in the Fall of 1871, as "The Chemical Society," but was afterwards expanded, as its present title indicates, and admits, by election, students from all departments of the University.

The collections of Chemical Preparations, and Botanical and Zoölogical Specimens belonging to the Society, are already important. During the past years persons have been sent to Texas and Brazil to collect specimens for these cabinets.

The Society has organized and maintained several courses of public scientific lectures.

Among the honorary members of the Society are more than one hundred of the most distinguished scientists in Europe and the United States.

THE ENGINEERING SOCIETY.

This Society, established and organized in February, 1873, under the auspices of the Professor of Engineering, is designed especially for the benefit of students in Civil, Mechanical and Mining Engineering.

GRADUATING THESES.

Every student, in each of the Schools, will be required to present a thesis upon some topic connected with his special School, as a necessary portion of the exercises for his final examination for a diploma. These theses shall be accompanied by drawings and diagrams, when the subjects need such illustration. The originals will be kept by the University, as a part of the student's record, for future reference; but a copy may be retained by the student, and be published, permission being first obtained from the President.

UNIVERSITY DAY AND EXHIBITIONS.

The day following the close of the Annual Examination shall be known as University Day. Upon this day the "Annual Exhibition of Graduates" shall take place in the presence of the Trustees, Faculty and invited guests. The exercises shall consist of orations

and essays by members of the Senior Class. Every student must perform the duty assigned to him, unless excused by the President.

THESIS DAY.

On the day preceding University Day, the Theses will be publicly read by the graduating students.

The University Sermon will be preached on the Sunday before University Day, under the direction of the President.

RESIDENT GRADUATES.

Graduates who desire to pursue their studies under the direction of the Faculty, may be allowed the use of the Library, and may attend the lectures in any of the Departments. Although not bound by University hours, they will be required to obey the directions of the President and of the Professors in reference to their departments, and will have their names placed upon the Annual Register.

AWARD ON UNIVERSITY DAY.

The Wilbur Scholarship (value $200) was awarded, in 1878, to Murray M. Duncan, of the Sophomore Class. This Scholarship, founded in 1872, by E. P. Wilbur, Esq., of South Bethlehem, is awarded annually to that student of the Sophomore Class having the best record.

THE UNIVERSITY SERMON

Was preached by the Rev. John H. Hopkins, D.D., on Sunday, June 16th, in the University Chapel.

THE ADDRESS BEFORE THE ALUMNI

Was delivered by Mr. Eckley B. Coxe, on Wednesday evening, June 19th.

GRADUATING THESES OF THE CLASS OF 1878

Were read on Wednesday, June 19th, at 9½ o'clock A. M., as follows:

IN CIVIL ENGINEERING.

Review of the Bridge on the Lehigh & Susquehanna Railroad at Bethlehem, Pa.

James E. Gilbert.

On the Determination of Azimuths.

Milnor Paret.

Review of the 200 feet span of the Bridge in the D. & B. R. R, at Yardley, N. J.

William K. Randolph.

Review of the Gilbert Elevated Railroad, New York City.

Henry C. Wilson.

IN MECHANICAL ENGINEERING.

Review of the Pumping Engine of the Lehigh Zinc Company at Friedensville, Pa.

Charles Bull.

Review of the Method of Burning Anthracite Coal Dirt, invented by Mr. Jno. E. Wootten.

William S. Hazlett.

Review of the Engine on the Steam-tug "Bruce."

Nathaniel Lafon, Jr.

Review of Myers' Rotary Engine.

Benjamin B. Nostrand, Jr.

Review of the Compound Blowing Engine at the Bethlehem Iron Works.

H. F. J. Porter.

IN MINING ENGINEERING.

Description of the Methods of working up the Steel Scrap produced in the Bessemer Process.

Frank Perley Howe, A. B.

IN ANALYTICAL CHEMISTRY.

The Coplay Cement Stone, raw and burned.

Jno. W. Eckert.

Examination of the Impurities of the Water of the Lehigh River.

George W. D. Hope.

General Discussion of Fertilizers.

William P. Palmer.

The Composition and Theory of Reduction of a Metallic Residue from the Zinc Oxide Furnace, South Bethlehem, Pa.

William S. Winterstein.

The Utilization of certain waste products for the production of Ammonia and its substitutes for Fertilizers.

Byron Wittman.

IN GENERAL LITERATURE.

General Literature and Industrial Arts as Factors in Civilization.

Robert H. Read.

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" " " " " 1876-7 and Map.

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O Novo Testamento, traduzide em Portuguez.
Die Naturlehre. Eberhard.
Transactions of Moravian Historical Society. Parts 1, 2, 4 and 5.
" " " " 2d Series. Part 1.
Yellow Fever. W. A. Shubert.
Ninety-eighth General Meeting, Society United Brethren.
Reisebericht einer Mission unter den Mongolen.
Works of Rev. Claudius Buchanan.
Die Arithmetik, Geometrie und Trigonometrie. Kastner.
Geographischer Atlas. Berlin: 1760.

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Notices, etc., qui concerne le corps des Mines, Exposition Universelle a Paris. 1878.

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Pennsylvania Archives. Vol. VII.

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From Department of the Interior.

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Reports K^3, N^2, D^2, E, F, G, H^4 and O.

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Annals Vol. IV. Part 2.
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Anales de la Oficina Meteorologica Argentina. Tome I.

From U. S. Coast Survey. J. E. Hilgard.

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From Diocese of Central Pennsylvania. R. A. Lamberton, Sec'y.

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From Supt. Meteorological Office, Toronto, Canada.

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The Works of Swedenborg. 20 Vols.

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Pennsylvania School Journal. 4 Vols., incomplete.
Odd copies of Nature, Engineering and American Educational Monthlies.

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"Iron Age," for year.

From James M. Swank, Sec'y.

Bulletin American Iron and Steel Association.
Statistics of American and Foreign Iron Trades to January, 1878.

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Journals of the Diocese of Pennsylvania. 1860 to 1869 inclusive, 1871 to 1873. 1875 and 1877.
Daily Churchman. October 5 to 28, 1871. October 9 to 15--23 to Nov. 4, 1874.
American Church Review. 1875-6.
London Quarterly Review. May, 1843.
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International Review. July and August, 1874.
Church Missionary Intelligencer. May to August, 1872.
Map of the Diocese of Central Pennsylvania.
Proceedings Board of Mission P. E. Church. 1872. 1875.
Catalogue Divinity School, West Philadelphia. 1873-4. 1874-5-6-7.
Stevens Institute. 1871.
Reports Advancement So. Penna. 1875-6-7-8.
West Philadelphia Divinity School. Constitution and By-Laws.
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Cornell University. 1873-4.
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Chemical Society, Lehigh University. Address. 1872.
New Constitution of Pennsylvania. 1873.
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Three Sermons by Rev. Dr. Percival. 1875.
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" " Rev. Dr. Crummell. 1875.
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Organization of Parish Association.
New Jersey Commission, Encouragement of Manufactures. 1878.

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Francis S. Holmes. Phosphate Rocks of South Carolina. Charleston. 1870. 8vo.

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THE LEHIGH UNIVERSITY,

SOUTH BETHLEHEM, PENNA.,

FOR THE YEAR 1879—80,

WITH THE PLAN OF ORGANIZATION AND COURSES OF INSTRUCTION.

TUITION FREE.

FOUNDED BY ASA PACKER.

BETHLEHEM, PA.:
HENRY T. CLAUDER, PRINTER.
1880.

CALENDAR.

1879—80.

1879.		
Sept. 3.	First Term begins	Wednesday.
Oct. 9.	Founder's Day	Thursday.
Nov. 27.	Thanksgiving Day	Thursday.
Dec. 22.	First Term ends	Monday.
1880.		
Jan. 12.	Second Term begins . . .	Monday.
Feb. 11.	Ash Wednesday . . .	
Feb. 22.	Washington's Birthday. . . .	Sunday.
March 25.	Easter Holidays begin . . .	Thursday.
March 29.	Easter Holidays end . . .	Monday.
June 7.	Annual Examination begins . .	Monday.
June 18-19.	Examinations for Admission	Friday and Saturday.
June 20.	University Sermon	Sunday.
June 23.	Reading of Theses	Wednesday.
June 24.	University Day . . .	Thursday.

1880—81.

188[illegible].		
Aug. 30-31.	Examinations for Admission	Monday and Tuesday.
Sept. 1.	First Term begins . . .	Wednesday.
Oct. 14.	Founder's Day	Thursday.
Nov. 25.	Thanksgiving Day . . .	Thursday.
Dec. 22.	First Term ends	Wednesday.
1881.		
Jan. 12.	Second Term begins . . .	Wednesday.

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* Will assume the duties April 1, 1880, in place of Rev. J. M. Leavitt, D.D., resigned.

THE LEHIGH UNIVERSITY.

ORIGIN.

The Hon. Asa Packer of Mauch Chunk, during the year 1865, appropriated the sum of Five Hundred Thousand Dollars, to which he added one hundred and fifteen acres of land in South Bethlehem, to establish an educational institution in the rich and beautiful Valley of the Lehigh. From this foundation rose The Lehigh University. In addition to these gifts, made during his lifetime, the last will of its Founder secured to the University an endowment of $1,500,000, and to the University Library one of $500,000.

DESIGN.

The original object of Judge Packer was to afford the young men of the Valley a complete technical education for those professions which had developed the peculiar resources of the surrounding region. Instruction was to be liberally provided in Civil, Mechanical and Mining Engineering; Chemistry, Metallurgy and Construction, and in all needful collateral studies. French and German were made important elements in the collegiate course. A School of General Literature was a part of the original plan, together with tuition in the ancient Classics. The Institution was freely opened to pupils from every part of the country and the world.

It is proposed, as soon as practicable, to establish various other technical professorships, and at the same time to develop and enlarge the Classical Department, and to have all the appointments of a complete University.

FREE TUITION.

It will be observed that all these educational facilities are provided without charge. Through the generosity of the Founder, the Trustees were enabled, in 1871, to declare tuition FREE in all branches and classes. The Lehigh University is open to young men of suitable talents and training from every part of our own land and of the world. We specially call to this fact the attention of the pupils of our public schools and of the graduates of classical institutions. Thus is offered, *without charge*, every facility for mastering the professions of the Civil, Mechanical and Mining Engineer, and of the Metallurgist and Analytical Chemist. In the Classical and Scientific departments of the School of General Literature instruction is given to those who wish to become Lawyers, Clergymen, Physicians, Editors or Merchants.

PUBLIC WORSHIP.

Prayers are attended in the Chapel every morning, and all the students are required to be present.

Divine Service is held on every Sunday morning, according to the forms of the Protestant Episcopal Church, in the Chapel of the University. Attendance at this service is required of every student, except in case of those connected with other religious bodies, to whom the President will grant permission at the beginning of each term (if requested by the parent or guardian, or by the student himself if he be 21 years of age) to attend during that term the place of worship of the body with which he is connected, where attendance on Sunday morning will in such cases be required.

SITE.

Nothing is wanting in the situation of the Institution. The salubrity of the climate and the beauty of the scenery cannot be surpassed. Situated in a region famous for its vast railway and manufacturing enterprises, near some of the richest iron and coal mines in our land, accessible to the great mechanical works of New York and Philadelphia, the students have rare facilities for confirming the teachings of the recitation room by the observation of the eye.

COMMUNICATIONS.

The University Buildings are about a half-mile from the depot, at the junction of the Lehigh Valley and North Pennsylvania Railroads, thus affording communication with all sections of the country. New York is about ninety, and Philadelphia fifty-four miles distant.

BUILDINGS.

Packer Hall, named after the Founder, stands seven hundred feet back of Packer Avenue, at the base of the Lehigh Mountain. Built of handsome stone, it presents to the north a noble and imposing front. At the western extremity is a belfry tower containing the President's Room and the Archive Room. The eastern end is a large advanced wing in which are Lecture and Recitation Rooms, and also a thoroughly equipped Chemical Laboratory. The central portion, eighty feet long, contains the Chapel, Drawing Room and Cabinets To the east of Packer Hall stands the University Library, erected by the Founder in memory of Mrs Lucy Packer Linderman, his daughter. To the west, within the grounds, are the houses of the President and Professors, comporting in architecture with Packer Hall. Towards the north-eastern extremity stand Christmas Hall and Saucon Hall, commodious brick edifices, containing students' rooms, heated by steam and lighted by gas, and a mess hall. At the south-western extremity stands the Sayre Observatory, the gift of Robert H. Sayre, Esq., of South Bethlehem, containing an Equatorial and a Zenith Telescope, Transit Instrument and Astronomical Clock.

EXPENSES.

As before stated, tuition is FREE in all branches and classes. Books, materials, paper, pencils, chemical materials used in the analytical laboratory, and instruments, are furnished by the student.

Rooms and board are provided in the University buildings, under the following rules:

1. The amount of room-rent, board, &c., for each term, must be paid in advance to the Treasurer of the Executive Committee, who will furnish the student with board ticket and key of room.

2. The charge for board and room-rent shall be $5 per week.

Where two students occupy a room jointly, the charge shall be $4.50 per week for each.

3. The charge for board without room shall be $4 per week. The charge for room without board shall be $2 per week for each room.

4. These prices include gas and heat.

5. Meal tickets will be furnished by the steward to students or friends visiting them, at 50 cents each, payable in advance to the steward.

6. The choice of rooms shall be in the order of the classes; in any class the first applicant to have the first choice.

7. Students may retain their rooms from year to year by giving notice of their intention so to do at the close of the academic year, and by procuring their tickets therefor on or before the first day of the next term.

8. Students are required to keep their rooms in order, or to employ some proper person to do so for them.

9. No furniture for rooms will be provided by the University.

10. The use of kerosene, coal oil or burning fluid, in any of the buildings, is prohibited.

NOTE.—Where clubs are formed the expenses of the student need not exceed $3.50 per week.

The following is an estimate of the necessary expenses for the collegiate year, clothing and traveling not included.

Board for 40 weeks from . . .	$115 to $160
Room rent, with fuel and lights .	20 " 80
Care of room and use of furniture . .	5 " 20
Washing and incidentals . . .	15 " 25
Books, stationery, etc. . . .	20 " 40
Total . . .	$175 to $325

ADMISSION OF STUDENTS.

Application for admission into the University should be made to the President, from whom all information may be obtained.

REGULAR STUDENTS.

All applicants for regular standing in the classes or schools must be prepared to pass an examination according to the programme of

studies. From this it will be seen that a student may be admitted at any time if able to pass a satisfactory examination in the studies already pursued by his class. The only exception will be in the case of any young man who is very nearly but not thoroughly prepared to enter in full standing in any class. Such an one may, at the discretion of the Faculty, be admitted conditionally, to make up his deficiencies by extra study under their direction. When they are made up, he will be received in full standing in his class

SPECIAL STUDENTS

May enter, selecting such studies as they please, upon a satisfactory examination, with the sanction of the Faculty.

REQUIREMENTS FOR ADMISSION.

Applicants for admission into the first class must be at least *sixteen* years of age, and must present testimonials of good moral character.

SCHOOL OF GENERAL LITERATURE.

CLASSICAL COURSE.

Mathematics.—Arithmetic complete, including the Metric System, Olney's complete School Algebra, or Davies' new Bourdon's Algebra, through equations of the second degree. Chauvenet's Geometry, six books.

English.—Correct Spelling, to be determined by writing from dictation in idiomatic English. Geography. English Grammar. Physical Geography, Mitchell's or Guyot's, or equivalent. United States History.

Latin.—A thorough knowledge of Latin Grammar. Cæsar's Commentaries, four books. Virgil's Æneid, four books Cicero's four Orations against Catiline.

Greek.—A thorough knowledge of Greek Grammar. Xenophon's Anabasis, four books. Homer's Iliad, four books.

SCIENTIFIC COURSE AND THE TECHNICAL COURSE IN CIVIL, MECHANICAL AND MINING ENGINEERING, METALLURGY AND CHEMISTRY.

Mathematics.—Arithmetic complete, including the Metric System. Olney's complete School Algebra, or Davies' new Bourdon's Algebra,

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English.—Correct Spelling, to be determined by writing from dictation in idiomatic English. Geography. Engl'sh Grammar. Mitchell's or Guyot's Physical Geography, or equivalent. United States History.

PROGRAMME OF STUDIES.

SHOWING THE NUMBER OF HOURS AND EXERCISES PER WEEK FOR EACH SUBJECT, AND THE TEXT-BOOKS USED.

The following is presented as the general programme of instruction, subject to such modifications from time to time as the Faculty may deem expedient, with the approval of the Trustees.

The names of the Authors studied are also given. The number of Exercises per week in each subject is indicated by the figure in parenthesis immediately following.

Two hours of Drawing, three of work in the Laboratory, or three of practice in the field, are regarded as equivalent to a recitation or lecture of one hour's duration.

THE SCHOOL OF GENERAL LITERATURE.

This school is intended to correspond, with some important differences, to the course long established in our older colleges, modified by the needs and requirements of modern culture. Its object is to impart a comprehensive and liberal education to those who design to enter upon professional rather than technical studies.

It comprises two distinct courses: I. The Classical Course. II. The Course in General Science.

THE CLASSICAL COURSE.

This school is chiefly designed for those who propose to study Law and Theology; it includes full and rigorous instruction in the Ancient Classics, in Elementary Science and in General Literature. The study of Mathematics in this course embraces Algebra, Geometry, Trigonometry, Analytical Geometry, and the Calculus. The programme includes Physics, Chemistry and Elementary Mechanics.

There are also full courses in History, in the Science of language and in the origin and growth of the English Language. There are also lectures on Psychology, the Christian Evidences, International and Constitutional Law and Political Economy. Lectures on English Literature are supplemented by critical readings of the standard English authors. Successful study in this course leads to the degree of B. A. (Bachelor of Arts).

THE COURSE IN GENERAL SCIENCE.

This course comprises most of the studies of the Classical Course, and is chiefly intended for those who, from circumstance or inclination, do not desire to study Latin and Greek. These being omitted, more extended instruction is given in French and German.

More time is also given to the Sciences. The instruction given in this Course will be particularly valuable to those who design to enter upon commercial pursuits, or matters of general industry. The degree of B. Sc. (Bachelor of Science) is conferred upon the graduate in this course.

CLASSICAL COURSE.

FRESHMAN CLASS.

FIRST TERM.

Latin.—Livy: Books XXI. and XXII. (4)
Greek.—Homer's Odyssey. Greek Prosody. (4)
History.—Weber's Outlines of History. (2)
Mathematics.—Chauvenet's Geometry (completed). (4)
Essays and Declamations. (2)

SECOND TERM.

Latin.—Horace: Satires and Epistles. Latin Prosody. (4)
Greek.—Xenophon's Memorabilia of Socrates. (4)
History.—Weber's Outlines of History. (2)
Mathematics.—Olney's University Algebra, Part III. Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (5)
Essays and Declamations. (1)

SOPHOMORE CLASS.

FIRST TERM.

Latin.—Cicero de Senectute and de Amicitia. (3)
Greek.—Herodotus: Persian Wars. (4)
English.—Coppée's English Literature. (4)
Mathematics—Analytical Geometry: Olney's General Geometry. (4)
Essays and Original Orations. (1)

SECOND TERM.

Latin.—Horace: Odes. (4)
Greek.—Euripides: Medea. (3)
Rhetoric.—Coppée's Rhetoric. (2)
English.—Lectures on the Science of Language. Müller and Farrar. (2)
Mathematics.—Differential and Integral Calculus: Olney. (4)
Essays and Original Orations. (1)

JUNIOR CLASS.

FIRST TERM.

Latin.—Tacitus: Histories. (2)
Greek.—Sophocles: Electra. (2)
History.—Lectures. (4)
Logic.—Coppée's Logic. (3)
Fine Arts.—Lectures. (1)
Physics.—Deschanel's Mechanics, with Lectures and Laboratory Practice. (2)
Anatomy and Physiology.—Lectures. (1)

SECOND TERM.

Latin.—Satires of Juvenal. (2)
Greek.—Thucydides. (2)
History.—Lectures on the Philosophy of History. (2)
English—Lectures on the English Language. Schele de Vere. (1)
Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)
Physics.—Galvanism, Acoustics, Light: Deschanel, with Lectures and Laboratory Practice. (5)

SENIOR CLASS.

FIRST TERM.

Latin.—Horace: Ars Poetica. (2)
Greek.—Theocritus. (2)
Christian Evidences.—Lectures. (1)
International Law and History.—Lectures. (1)
English Literature and History.—Lectures. (3)
Descriptive Astronomy.—Loomis' Treatise, with Lectures. (3)
Physics —Heat, Meteorology, Barometrical Leveling and Measurement of Heights, Magnetism and Statical Electricity. Lectures with Laboratory Practice. (3)

SECOND TERM.

Latin.—Cicero de Officiis. (3)
Greek.—Demosthenes: Public Orations. (2)
Psychology and Christian Evidences.—Lectures. (2)
Political Economy.—Lectures. (1)
Constitutional Law and History.—Lectures. (2)
Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (3)
Geology.—Lectures. Dana. (2)
Preparation of Thesis.

SCIENTIFIC COURSE.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Chauvenet's Geometry, (completed). (4)
French.—Fasquelle's Introductory French Course. Gibert's second French Reader. (3)
German.—Otto's Grammar. Writing in German Text. Translation into English. (4)
History.—Weber's Outlines of History. (2)
Elementary Drawing. (2)
Essays and Declamations. (1)

SECOND TERM

Mathematics. – Olney's University Algebra, Part III. Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables (5)

French.—Languillier's and Monsanto's Practical French Course. Chouquet's First Readings from Modern French writers. (3)

German.—Otto's Grammar. Schlegel's second Classical German Reader. (2)

History.—Weber's Outlines of History. (2)

Drawing. (2)

Essays and Declamations. (1)

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

French.—Languillier's and Monsanto's Practical French Course. Chouquet's First Readings from Modern French writers. Practical Exercises in Translation from French into English. (3)

German.—Otto's German Grammar. Schlegel's second Classical Reader. Practical Exercises in Translation from German into English. (3)

English.—Coppée's English Literature. (4)

Drawing. (1)

Essays and Original Orations. (1)

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry.—General Orthographic Projections, Isometric Drawing: Church. (3)

French.—Poitevin: Grammaire Élémentaire, in French. Written Exercises. Chapsal: Leçons et Modèles de Littérature Française. (2)

German.—Scientific Readings. Exercises. (2)

Rhetoric.—Coppée's Rhetoric. (2)

English.—Lectures on the Science of Language. Müller and Farrar. (2)

Essays and Original Orations. (1)

JUNIOR CLASS.

FIRST TERM.

Physics.—Deschanel's Mechanics, with Lectures and Laboratory Practice. (2)

Anatomy and Physiology.—Lectures. (1)

French.—Poitevin, continued. Exercises. Systematic Scientific Readings. Chapsal continued. (2)

German.—Systematic Scientific Readings. Translation from German into English. Compositions in German (2)

History.—Lectures. (4)

Logic.—Coppée's Logic. (3)

Fine Arts.—Lectures. (1)

SECOND TERM.

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

Physics.—Galvanism, Acoustics, Light: Deschanel, with Lectures and Laboratory Practice. (5)

French.—Systematic Readings. Composition. Bougeault: Précis de la Littérature Française. (2)

German.—Systematic Scientific Readings. Compositions. Translations. Lectures on German Literature. (2)

History.—Lectures on the Philosophy of History. (2)

English.—Lectures on the English Language. Schele de Vere. (1)

SENIOR CLASS.

FIRST TERM.

Physics.—Deschanel's Heat, Magnetism and Statical Electricity. Lectures, with Laboratory Practice. (3)

Descriptive Astronomy.—Loomis' Treatise, with Lectures. (3)

Chemistry.—Lectures. (2)

Crystallography.—Lectures with Practical Exercises in the Determination of Crystals. (2)

Christian Evidences.—Lectures. (1)

International Law.—Lectures. (1)

English Literature and History.—Lectures. (3)

SECOND TERM.

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (3)

Mineralogy.—Descriptive and Determinative, with Practice. E. S. Dana. (3)

Surveying.—Gillespie's Surveying (2)

Geology.—Lectures. Dana's Treatise. (2)

Psychology and Christian Evidences —Lectures. (2)

Political Economy.—Lectures. (1)

Constitutional Law and History.—Lectures. (2)

Preparation of Thesis.

TECHNICAL COURSES.

The first three terms (one year and a half) have the same curriculum of studies for all the Technical Schools. At the end of that time the student selects his course and follows the programme laid down for the School selected.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Chauvenet's Geometry, (completed). (4)

Physics.—Deschanel's Mechanics, with Lectures and Laboratory Practice. (2)

French —Fasquelle's Introductory French Course. Gibert's second French Reader. (3)

German —Otto's Grammar. Writing in German Text. Translation of German into English. (4)

Elementary Drawing —Warren. (2)

Essays and Declamations (1)

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (5)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

French.—Languillier's and Monsanto's Practical French Course. Chouquet's first Readings from Modern French writers. (3)

German.—Otto's Grammar. Schlegel's second Classical German Reader. (2)

Drawing.—Warren's Projection Drawing. (2)

Essays and Declamations. (1)

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (5)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity. Lectures, with Laboratory Practice. (3)

French or German.—As in the Scientific Course of the School of General Literature. (3)

Essays and Original Orations. (1)

THE SCHOOL OF CIVIL ENGINEERING.

The general scope of this School comprises the higher branches of the applied mechanics and mathematics, together with the principles of construction and exercises in mapping, drawing and designing. Thus, the student is made acquainted with the theory of elasticity or flexure, including the strength of materials, the principles of construction of roof-trusses, beams, girders and bridges, as well as the practical designing of such structures, the determination of their proper dimensions and the preparation of working drawings. Under this head belongs also the theory of the stability of structures, including the theory of the arch and the construction of retaining walls; together with the theory of motion as applied to machines, the principles of hydrostatics and hydraulics with their applications to water-pressure engines, vertical water wheels and turbines.

In all cases, practical examples, such as occur in actual engineering practice, are taken up and discussed, and, together with the analytical or algebraic methods, the student is also instructed in

practical graphical solutions of the various problems, wherever such solutions present a special value in practice. Much time is devoted to surveying operations and to actual practice in the field. Profiles, plans of topographical surveys, contour maps, and railroad charts, are made The practical operations connected with the reconnoissance, location and surveys of roads, canals and railroads, such as cross sectioning, setting grade stakes, laying out of curves and calculation of excavation and embankment, are fully illustrated in the field. Thorough instruction is given in drawing, the construction of working drawings of structures, the designing of bridges and roofs, topography and hydrographical charts.

Attention is also paid to the application of the general principles of the science of engineering, or to engineering considered as an art. Under this latter head may be classed the composition and qualities of materials used in construction, iron, steel, wood, stone; their dressing and preservation; foundations, earth and rock-work; harbor and river improvements, drainage, collection and distribution of water.

So much of Mechanical Engineering is necessarily included, as refers to the construction of bridges, and the special machinery and appliances used in the erection of structures.

Designs for, and reviews of, special structures, specifications and estimates of quantities and cost, and the preparation of a graduation Thesis giving evidence of satisfactory attainments, complete the course. The graduate of this School will receive the degree of C. E. (Civil Engineer.)

Graduates of the School of Civil Engineering, by remaining one year and pursuing one of the courses of studies elsewhere laid down may receive the degree of M. E. (Mechanical Engineer) or E. M. (Engineer of Mines.)

SCHOOL OF CIVIL ENGINEERING.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry.—General Orthographic Projections. Isometric Drawing. Church. (3)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles. Contour Maps. Gillespie. (3)

Construction.—Civil Engineering. Trautwine. (1)

Physics.—Galvanism, Acoustics, Light: Deschanel with Lectures and Laboratory Practice. (5)

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus: Courtenay. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in General. Statics. Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Descriptive Geometry.—Warped Surfaces. Shades and Shadows. Linear Perspective. Church. (3)

Surveying.—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. (5)

Crystallography.—Lectures. (1)

SECOND TERM.

Applied Mechanics.—Resistance of Materials. Theory of Flexure. Wood, or Stoney. (3)

Kinematics.—Principles of Mechanism. Goodeve and Unwin. (3)

Stereotomy.—Stone Cutting. Machine Drawing. Working Drawings. Warren. (3)

Surveying.—Mine Surveying. Road and Railroad Surveying. Location of a Railroad Line. Profile, Map and Estimate of Cost. Henck. (3)

Mineralogy.—Descriptive and Determinative, with Practice. E. S. Dana. (3)

Construction.—Lectures. Visits of Inspection. (1)

SENIOR CLASS.

FIRST TERM.

Applied Mechanics.—Theory of Retaining Walls, Arches, Roofs and Bridges. Graphical Statics. (5)

Construction.—Principles of Construction and Design. Reports on, and Designs for, Simple Structures. Visits of Inspection. (3)

Surveying.—Hydrography and Geodesy. (2)

Astronomy.—Descriptive Astronomy: Loomis (3)

Christian Evidences.—Lectures. (1)

English Literature and History.—Lectures. (2)

SECOND TERM

Applied Mechanics.—Hydraulics and Hydraulic Motors. Steam and Steam Engines (5)

Construction.—Specifications and Contracts. Original Designs and Estimates for Engineering Projects. Visits of Inspection. (5)

Astronomy.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescopes. (2)

Geology.—Lectures. Dana. (2)

Preparation of Theses.

POST GRADUATE COURSE FOR MECHANICAL ENGINEERS FOR THE DEGREE OF CIVIL ENGINEER.

FIRST TERM.

Surveying.—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. (5)

Construction.—Principles of Construction. Erection of Structures. Reports on, and Designs for, Simple Structures. (3)

Surveying.—Hydrography and Geodesy. (2)

SECOND TERM.

Stereotomy.—Stone Cutting. (2)

Surveying.—Mine Surveying. Road and Railroad Surveying. Location of a Railroad Line. Profile, Map and Estimate of Cost. Henck. (3)

Construction.—Original Designs and Estimates for Engineering Projects. (3)

Astronomy.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory Work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescopes. (2)

Preparation of Theses.

THE SCHOOL OF MECHANICAL ENGINEERING.

While the problems which the Civil Engineer is called upon to solve are mainly statical problems, involving the idea of rest or equilibrium, and the ends to be obtained in his constructions are stiffness, rigidity and immobility; the object of the Mechanical or Dynamical Engineer, on the other hand, is not to avoid or prevent, but to cause motion, not to oppose the action of the forces of nature, but so to guide and use them as to obtain the desired results in the best manner and with the least expenditure of force and material. The two professions are thus, in the nature of the problem with which they have to do, to a certain extent antithetical. The sciences, however, of which both make use, and the fundamental principles, by the application of which the desired results are in each case obtained, are, to a considerable extent, identical.

Thus, the higher branches of the mathematics and of applied mechanics, as well as the principles of constructions, are common to both Schools. So also as regards the theory of elasticity or flexure and the strength and properties of materials. Much, therefore, of the course as already indicated for the School of Civil Engineering, finds here also a place, as will appear from an examination of the detailed course of study given below.

In the practical application of the principles common to both, however, the two Schools diverge. Thus special attention is directed to the applications of the principles of mechanics to machinery, in the construction of stationary, locomotive and marine engines, hydraulic motors of various kinds, blast furnaces and their appurtenances, foundries, rolling mills and steel works. Information is afforded of the methods of casting and working in iron and other metals, and of making and using the tools employed in these processes.

Much attention is paid to the execution of working drawings, and to the theory of mechanism. The proximity of numerous blast

furnaces, rolling mills, foundries, machine shops and factories, enables the student to see the practical workings of such establishments and to obtain valuable practical information in the various branches of mechanical engineering.

Visits of inspection to the workshops, mills and blast furnaces in the neighborhood, with explanations of the machinery and tools used, form an important feature of the course.

The graduate in this School will receive the degree of M. E. (Mechanical Engineer.)

Graduates of the School of Mechanical Engineering, by remaining an additional year and pursuing the course of studies elsewhere laid down, may receive the degree of C. E. (Civil Engineer.)

THE SCHOOL OF MECHANICAL ENGINEERING.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry.—General Orthographic Projections. Isometric Drawing. Church. (3)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles. Contour Maps. Gillespie. (3)

Physics.—Galvanism, Acoustics, Light: Deschanel, with Lectures and Laboratory Practice. (5)

Construction.—Machine Tools and Processes. Rose. (1)

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus: Courtenay. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Descriptive Geometry.—Warped Surfaces. Shades and Shadows. Linear Perspective. Church. (3)

Construction.—Machine Drawing. Working Drawings. Pattern Making, Moulding and Casting. Rose. (5)

Crystallography.—Lectures. (1)

SECOND TERM.

Applied Mechanics.—Resistance of Materials. Theory of Flexure. Wood, or Stoney. (3)

Kinematics.—Principles of Mechanism. Goodeve and Unwin. (3)

Machine Drawing.—Sketches of Machines. Working Drawings of Machinery. Elements of Machine Design. (3)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

Construction.—Lectures. Visits of Inspection. (1)

SENIOR CLASS.

FIRST TERM.

Applied Mechanics.—Theory of Retaining Walls, Arches, Roofs and Bridges. Graphical Statics. (5)

Construction.—Forging and Riveting. Workshop Appliances and Processes. Reports on, and Designs for, Simple Machines. Visits of Inspection. (3)

Thermodynamics.—General Principles of Air Engines. (2)

Astronomy.—Descriptive Astronomy: Loomis. (3)

Christian Evidences.—Lectures. (1)

English Literature and History.—Lectures. (2)

SECOND TERM.

Applied Mechanics.—Hydraulics and Hydraulic Motors. Steam and the Steam Engine. (5)

Kinematics.—Link and Valve Motion. Auchincloss. (2)

Construction.—Specifications and Contracts Original Designs and Estimates for Machines. Visits of Inspection. (5)

Geology.—Lectures. Dana. (2)

Preparation of Theses.

POST GRADUATE COURSE FOR CIVIL ENGINEERS FOR THE DEGREE OF MECHANICAL ENGINEER.

FIRST TERM.

Stereotomy.—Elements of Machine Drawing Working Drawings. (3)

Construction.—Pattern Making, Moulding and Casting. Forging and Riveting. Workshop Appliances and Processes. Reports on, and Designs for, Simple Machines. (5)

Thermodynamics.—Theory of Heat. Shann. (2)

SECOND TERM.

Kinematics.—Link and Valve Motion. Auchincloss. (2)

Machine Drawing.—Sketches of Machines. Working Drawings. Elements of Machine Design. (2)

Construction.—Original Designs and Estimates for Machines. (3)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Preparation of Theses.

THE SCHOOL OF MINING AND METALLURGY.

The full course in this School comprises, besides the Mathematical, Physical, Chemical and Literary studies necessary to all technical education, courses in Mining, Metallurgy, Geology, Mineralogy, Machines, Qualitative and Quantitative Analysis, Assaying, Blowpipe Analysis, Topographical and Mine Surveying and Drawing. On account of the great number and scope of the studies necessary to the completion of the full course, it is four years and a half in length.

The graduate in this School, who has taken the full course, will receive the degree of E. M. (Engineer of Mines.)

A partial course may be taken in this School by those who wish to pursue the study of Metallurgy. The course of Metallurgy includes the studies of the full course, except those of Mining and Surveying. The length of the course is four years.

The graduate of this School in the Metallurgical course will receive the degree of Metallt. (Metallurgist.)

A Post Graduate course has been arranged in this School, comprising courses in Mining, Metallurgy, Chemical Analysis and Blow-pipe Analysis, with supplementary courses in Geology and Mineralogy.

Graduates in the School of Civil Engineering, by remaining one year and taking this course, may obtain the degree of E. M.

In the courses of Mineralogy, Geology and Analytical Chemistry, much attention is paid to the practical instruction of the student in determining minerals by their crystallographical and physical properties, and, by the aid of blow-pipe analysis, in the determination of rocks; in the qualitative and quantitative examination of ores and metallurgical products and in the rapid methods of assaying ores by the dry and wet ways employed in metallurgical laboratories. The vicinity to the iron works of the Lehigh Valley and especially to the works of the Bethlehem Iron Company, with its blast furnaces, foundry and machine shops, and Bessemer, puddle, iron and steel rail mills, affords unusual facilities for the practical study of iron metallurgy. The processes of the manufacture of spelter and oxide of zinc may be studied at the works of the Lehigh Zinc Company. The facilities for the practical study of mining and economic geology are hardly less great. The mines of the Lehigh Zinc Company and the brown hematite and slate deposits of the Lehigh Valley are in the immediate vicinity, while within easy reach by rail are the anthracite coal fields of Pennsylvania, the iron and zinc mines of New Jersey, and the celebrated iron mines at Cornwall, Pa.

THE SCHOOL OF MINING AND METALLURGY.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry.—General Orthographic Projections. Isometric Drawing. Church. (3)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles. Contour Maps. Gillespie. (3)

Physics.—Galvanism, Acoustics, Light: Deschanel, with Lectures and Laboratory Practice. (5)

Blow-pipe Analysis.—Lectures and Practice. Plattner, Brush, or Nason and Chandler. (1)

JUNIOR CLASS.

FIRST TERM.

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Surveying.—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. (5)

Crystallography.—Lectures, with Practical Exercises in the Determination of Crystals. (2)

Chemical Philosophy.—Cooke. (4)

SECOND TERM.

Surveying.—Mine Surveying. (1)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

Blow-pipe Analysis.—Practice. (1)

Applied Mechanics.—Resistance of Materials. Theory of Flexure. Wood, or Stoney. (3)

Chemical Philosophy.—Cooke. (3)

Chemistry.—Quantitative Analysis. Laboratory Practice. (2)

SENIOR CLASS.

FIRST TERM.

Applied Mechanics.—Theory of Retaining Walls, Arches, Roofs and Bridges. (3)

Geology.—Lithology, with Practical Exercises in the Determination of Rocks. Lectures. (3)

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. Fresenius. (3)

Astronomy.—Descriptive Astronomy: Loomis. (3)

SECOND TERM.

Applied Mechanics.—Hydraulics and Hydraulic Motors. Steam and Steam Engines. (5)

Mining.—Modes of Occurrence of the Useful Minerals. Searching for Mineral Deposits. Examination of Mining Properties. Boring. Mining Tools, Machines and Processes. Timbering and Masonry. Methods of Exploitation. Callon. André. (3)

Geology.—Historic, Dynamic and Economic Geology. Dana. (3)

Astronomy.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory Work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescopes. (2)

Assaying.—Including the Assay by the Dry Methods of Gold, Silver, Copper, Lead, Iron and Tin Ores. Laboratory Work. Ricketts. (1)

FIFTH YEAR.

FIRST TERM.

Mining.—Underground Transportation. Hoisting, Drainage and Pumping. Ventilation and Lighting. Mechanical Preparation of Ores. Coal Washing. Callon. André. (4)

Chemistry.—Quantitative Analysis. (6)

Christian Evidences.—Lectures. (1)

English Literature and History.—Lectures. (2)

Preparation of Theses.

METALLURGICAL COURSE.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry.—General Orthographic Projections. Isometric Drawing. Church. (3)

Physics.—Galvanism, Acoustics, Light: Deschanel, with Lectures and Laboratory Practice. (5)

Blow-pipe Analysis.—Lectures, with Practice. Plattner, Brush, or Nason and Chandler. (1)

Assaying.—Including the Assay by the Dry Methods of Gold, Silver, Copper, Lead, Iron and Tin Ores. Laboratory Work. Ricketts. (1)

Structure Drawing.—Furnaces and Metallurgical Apparatus. (2)

JUNIOR CLASS.

FIRST TERM.

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Chemical Philosophy.—Cooke. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. Fresenius. (3)

Crystallography.—Lectures, with Practical Exercises in the Determination of Crystals. (2)

Machine Drawing.—Elements of Machine Drawing. Working Drawings. (2)

SECOND TERM.

Applied Mechanics.—Resistance of Materials. Theory of Flexure. Wood, or Stoney. (3)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

Blow-pipe Analysis.—Practice. (1)

Chemical Philosophy.—Cooke. (3)

Kinematics.—Principles of Mechanism. Goodeve and Unwin. (3)

SENIOR CLASS.

FIRST TERM.

Applied Mechanics.—Theory of Retaining Walls, Arches, Roofs and Bridges. (3)

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. (3)

Geology.—Lithology, with Practical Exercises in the Determination of Rocks. Lectures. (3)

Christian Evidences.—Lectures. (1)

English Literature and History.—Lectures. (2)

SECOND TERM.

Applied Mechanics.—Hydraulics and Hydraulic Motors. Steam and the Steam Engine. (5)

Kinematics.—Link and Valve Motion. Auchincloss. (2)

Chemistry.—Quantitative Analysis. Laboratory Work. (4)

Geology.—Historic, Dynamic and Economic Geology. Lectures. Dana. (3)

Preparation of Theses.

POST GRADUATE COURSE FOR CIVIL ENGINEERS FOR THE DEGREE OF MINING ENGINEER.

FIRST TERM.

Mining.—Underground Transportation. Hoisting. Drainage and Pumping. Ventilation and Lighting Mechanical Preparation of Ores. Coal Washing. (4)

Geology.—Lithology, with Practical Exercises in the Determination of Rocks. Dana. (1)

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. (6)

Crystallography.—Practical Exercises in the Determination of Crystals. E. S. Dana. (1)

SECOND TERM.

Mining.—Modes of Occurrence of the Useful Minerals. Searching for Mineral Deposits. Examination of Mining Properties. Boring. Mining Tools, Machines and Processes. Timbering and Masonry. Methods of Exploitation. (4)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Geology.—Historic, Dynamic and Economic Geology. Dana. (3)

Chemistry.—Quantitative Analysis. Laboratory Work. (3)

Assaying.—Including the Assay by the Dry Methods of Gold, Silver, Copper, Lead, Iron and Tin Ores. Ricketts. (1)

Blow-pipe Analysis.—Practice. (2)

THE SCHOOL OF CHEMISTRY.

The course of instruction in this School continues the subject of Theoretical Chemistry from the general course of the two previous terms, the subject of Chemical Philosophy and Organic Chemistry being taught by daily recitations in the Junior and Senior years.

In Analytical Chemistry, the course of Qualitative Analysis in the first term of the second year is followed by preparation of Chemical Compounds and the Purification of Chemicals.

Subsequently, Quantitative Analysis is pursued to the end of the course, including the Dry Assaying of Ores of Gold, Silver, Copper, Lead, Iron and Tin, and the Wet Analyses, included in the appended schedule. In addition, courses of Lectures on Medical, Agricultural and Technical Chemistry are given, and various industrial establishments in the neighborhood and in Philadelphia and New York are visited, in the company of an instructor. The course also includes thorough instruction in Physics and Mechanics, Mineralogy and Blow-pipe Analysis, Metallurgy, Geology and Descriptive Astronomy.

The last term of the Senior year is mainly devoted to the preparation of a Thesis on some subject, selected by the Professor, involving practical work in the Laboratory, in addition to the literary labor, and each graduate will thus make a contribution to the progress of the science as a preliminary to the reception of his degree.

The course is thus seen to include thorough instruction in theoretical and applied chemistry, in their various branches, as well as in those cognate sciences of such great value to the chemist.

The Laboratories are under the immediate charge of the Professor and his Assistant, and, together with the Lecture-room, are unsurpassed in excellence by any similar establishment in the country, being supplied with all the modern improvements. The collections of apparatus, specimens and models, illustrating theoretical and applied chemistry, are already important and rapidly increasing.

Students are charged for the chemicals and apparatus consumed. If the student is moderately careful, this expense need not exceed $60 per year.

The graduate of this School will receive the degree of A. C. (Analytical Chemist.)

THE SCHOOL OF CHEMISTRY.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry.—General Orthographic Projections. Isometric Drawing. Church. (3)

Physics.—Galvanism, Acoustics, Light: Deschanel, with Lectures and Laboratory Practice. (5)

Chemical Preparations.—Including the Preparation of Chemical Compounds and the Purification of Chemicals by Distillation, Sublimation, Fusion, Crystallization, Precipitation, etc. (1)

Assaying.—Including the Assay by the Dry Methods of Gold, Silver, Copper, Lead, Iron and Tin Ores. Ricketts. (1)

Blow-pipe Analysis.—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

JUNIOR CLASS.

FIRST TERM.

Chemical Philosophy.—Cooke. (4)

Toxicology.—Otto on Poisons. (1)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (7)

The following analyses are executed by the students:

1. Iron Wire (Fe)
2. Potassic Dichromate (Cr_2O_3)
3. Baric Chloride (Ba, Cl, H_2O)
4. Magnesic Sulphate (MgO, SO_3, H_2O)
5. Hydro Di-Sodic Phosphate (P_2O_5)
6. Bronze (Cu, Sn, Zn)
7. Rochelle Salt (K_2O, Na_2O)
8. Volumetric Determination of Chlorine.

9. Acidimetry (HCl, H_2SO_4, HNO_3)
10. Alkalimetry (KOH, NaOH, NH_4OH)
11 Chlorimetry (Bleaching Powders)
12. Silver Coin (Au, Ag, Pb, Cu)
13. Zinc Ore (Zn)

Crystallography.—Lectures, with Practical Exercises in the Determination of Crystals. (2)

Anatomy and Physiology.—Lectures. (1)

SECOND TERM.

Chemical Philosophy.—Cooke. (3)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (5)

The following analyses are executed by the students:

14. Copper Ore (Cu)
15. Spiegeleisen (Mn)
16. Lead Ore (PbS)
17. Ilmenite (TiO_2)
18. Iron Ore (Complete Analysis)
19. Limestone (Complete Analysis)
20. Coal (Volatile Matter,—Fixed Carbon, Ash, H_2O, S, P)
21. Slag (Complete Analysis)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

SENIOR CLASS.

FIRST TERM.

Organic Chemistry.—Wöhler. (4)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (5)

The following analyses are executed by the students:

22. Guano (NH_3, P_2O_5, H_2O)
23. Clay (Complete Analysis)
24. Manganese Ore (MnO_2)
25. Mineral Water (Complete Analysis)
26. Pig Iron (Complete Analysis)

27. Nickel Ore (Ni, Co)
28. Organic Analysis (C, H, O, N)
29. Gas Analysis (Complete Analysis of Illuminating Gas.)

Astronomy.—Descriptive Astronomy: Loomis. (3)

Christian Evidences.—Lectures. (1)

English Literature and History.—Lectures. (2)

SECOND TERM.

Chemistry Applied to the Arts.—Lectures. (3)

Medical Chemistry.—Lectures. (1)

Agricultural Chemistry.—Lectures. (1)

Geology.—Historic, Dynamic and Economic Geology. Lectures. Dana. (2)

Preparation of Theses.

GRADUATING THESES.

Every student, in each of the Schools, will be required to present a thesis upon some topic connected with his special School, as a necessary portion of the exercises for his final examination for a diploma. These theses shall be accompanied by drawings and diagrams, when the subjects need such illustration. The originals will be kept by the University, as a part of the student's record, for future reference; but a copy may be retained by the student, and be published, permission being first obtained from the President.

RESIDENT GRADUATES.

Graduates who desire to pursue their studies under the direction of the Faculty, may attend the lectures in any of the Departments. Although not bound by University hours, they will be required to obey the directions of the President and of the Professors in reference to their departments, and will have their names placed upon he Annual Register.

DIPLOMAS AND CERTIFICATES.

The Diploma is given only to those who have passed examinations in a regular course in the classes and in one of the Schools. For all partial courses a certificate is given of what the student has accomplished.

POSTGRADUATE DEGREES.

M. A.

The Faculty will recommend for the Degree of Master of Arts, candidates otherwise properly qualified, who, after taking the Degree of Bachelor of Arts, shall pursue for at least two years, at the University, a course of liberal study approved by the Faculty, pass a thorough examination on the same, and present satisfactory theses.

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The Faculty will recommend for the Degree of Doctor of Philosophy, candidates otherwise properly qualified, who, after taking either of the Degrees of Civil, Mechanical or Mining Engineer, or Analytical Chemist, shall pursue, for two years, at the University, a course of advanced Scientific study in the line of their profession, pass a thorough examination in the same, and present satisfactory theses.

D. Sc.

The faculty will recommend for the Degree of Doctor of Science, candidates otherwise properly qualified, who, after taking the Degree of Bachelor of Science, shall pursue for at least two years, at the University, a course of Scientific study, embracing two subjects approved by the Faculty, pass a thorough examination, showing in one of the subjects special attainments, and shall present satisfactory theses in one of the subjects, based upon original scientific investigation.

The requirement of residence may be omitted in special cases by the Faculty.

THE UNIVERSITY LIBRARY.

The Library Building was erected by the Founder of the University in 1877, at a cost of One Hundred Thousand Dollars, as a memorial of his daughter, Mrs. Lucy Packer Linderman, and during the same year more than Twenty Thousand Dollars were con-

tributed by the family and friends of that estimable woman, as a memorial fund for the purchase of books. By the will of the Founder of the University a fund of $500,000 has been given for the permanent endowment of the Library.

The building is semi-circular in plan, with a handsome façade in the Venetian style of architecture. It is constructed of Potsdam sandstone with granite ornamentation. In the interior, the centre is occupied as a reading space, fifty by forty feet, from which radiate the book cases, extending from floor to ceiling; two galleries affording access to the upper cases. Shelf room is now provided for Eighty Thousand Volumes. The building is thoroughly fireproof, well lighted, and heated by steam.

Eighteen thousand volumes are now upon the shelves, including many extremely valuable works. The list of periodicals numbers about fifty, embracing as far as possible all departments of knowledge.

The Library is conducted strictly for consultation, and is open to the use of the public; both of which conditions are in accord with the terms of the gift.

REGULATIONS OF THE LEHIGH UNIVERSITY LIBRARY.

I. The Library is open every day, except Sundays and Legal Holidays, from 8 A. M. until 9 P. M.

II. Admission is free to all persons over 16 years of age.

III. Readers are required to write their names and addresses in the Daily Register of the Library. They also write the name of the book desired upon a Library Card, with their signatures, and present the same to the Director's Clerk, who supplies the book, retaining the card as a receipt. Before leaving the Library, readers return their books to the clerk and receive their cards.

IV. No book is permitted, under any circumstances, to be taken from the Library.

V. No person is allowed to enter the alcoves, or remove any book from the shelves, without the permission of the Director.

VI. Readers wishing to consult the more valuable illustrated works make special application for that purpose.

VII. In taking notes, pencils, and not pens and ink, are to be used.

VIII. Audible conversation and the use of tobacco are strictly forbidden in any part of the Library.

IX. Any person not conforming to these Regulations, will be denied the privileges of the Library.

X. Any person who defaces, in any way, any book, magazine or paper, or the furniture, or any portion of the building, in addition to being deprived of the privileges of the Library, will be prosecuted according to law.

OBSERVATORY.

By the liberality of Robert H. Sayre, Esq., one of the Trustees of the University, an Astronomical Observatory has been erected on the University grounds, and placed under the charge of the Professor of Mathematics and Astronomy.

In the dome of the observatory is mounted an Equatorial Telescope, of six inches aperture, by Alvan Clark & Sons. The west wing contains a superior Sidereal Clock, by Wm. Bond & Sons; a Zenith Telescope, by Blunt, and a Field Transit, by Stackpole. There is also a Prismatic Sextant, by Pistor & Martins.

Students in practical Astronomy receive instruction in the use of the instruments and in actual observation.

The grounds upon which the observatory stands, consisting of seven acres of land adjoining the original grant, were presented to the University by Charles Brodhead, Esq., of Bethlehem.

An advanced course in Astronomy and the higher Analysis has been established, requiring two years for its completion.

It is adapted to the attainments of the graduates of this University, but is open to any one who may be prepared to pursue it.

This course embraces the following subjects:

First Year — Spherical Astronomy. Theory of Instruments. Method of Least Squares. Numerical Calculus.

Second Year—Celestial Mechanics. Interpolation and Quadrature. Computation of Orbits and Perturbations.

During the entire course, the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

THE CHEMICAL AND NATURAL HISTORY SOCIETY OF THE LEHIGH UNIVERSITY.

This Society was organized in the Fall of 1871, as "The Chemical Society," but was afterwards expanded, as its present title indicates, and admits, by election, students from all departments of the University.

The collections of Chemical Preparations, and Botanical and Zoölogical Specimens belonging to the Society, are already important. During the past years persons have been sent to Texas and Brazil to collect specimens for these cabinets.

The Society has organized and maintained several courses of public scientific lectures.

Among the honorary members of the Society are more than one hundred of the most distinguished scientists in Europe and the United States.

FOUNDER'S DAY.

On the second Thursday of October of each year Commemorative Exercises are held in honor of the Founder of the University.

On Thursday, October 9th, 1879, the first celebration of Founder's Day occurred. A full length portrait of the Founder of the University, presented by his sons, was unveiled in the University Library, and in the Chapel a religious service, appropriate to the occasion was held and a Memorial Discourse delivered by the Rt. Rev. M. A. deW. Howe, D.D., LL.D., Bishop of the Diocese and President of the Board of Trustees. In the afternoon the Annual Sports of the University Athletic Association took place in the new Athletic Grounds, then first opened to the public, and in the evening there was a display of fireworks.

UNIVERSITY DAY AND EXHIBITIONS.

The day following the close of the Annual Examination shall be known as UNIVERSITY DAY. Upon this day the "Annual Exhibition of Graduates" shall take place in the presence of the Trustees, Faculty and invited guests. The exercises shall consist of orations and essays by members of the Senior Class. Every student must perform the duty assigned to him, unless excused by the President.

THESIS DAY.

On the day preceding University Day, the Theses will be publicly read by the graduating students.

The University Sermon will be preached on the Sunday before University Day, under the direction of the President.

AWARD ON UNIVERSITY DAY.

The Wilbur Scholarship (value $200) was awarded, in 1879, to Patrick A. Crilly, of the Sophomore Class. This Scholarship, founded in 1872, by E. P. Wilbur, Esq., of South Bethlehem, is awarded annually to the student of the Sophomore Class having the best record.

THE UNIVERSITY SERMON

Was preached by the President, on Sunday, June 15th, in the University Chapel.

THE ADDRESS BEFORE THE ALUMNI

Was delivered by Prof. R W. Raymond, Ph.D., on Wednesday evening, June 18th.

GRADUATING THESES OF THE CLASS OF 1879.

IN CIVIL ENGINEERING.

Improvement of the Road from the Old Lehigh Bridge to Main Street, Bethlehem.

F. W. Sargent.

Iron Highway Bridge over the Androscoggin at Brunswick, Maine.

Richard H. Tucker.

IN MECHANICAL ENGINEERING.

Inspection and Testing of Steam Boilers.

Jas. S. Cunningham.

Defecators and Vacuum Pans in Sugar Refining.

Joseph H. Paddock.

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"Monthly Weather Review" for the year.

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Report of Commissioner of Education. 1877.

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Statistics of American Trade.
Proceedings of Convention of Iron and Steel Manufacturers, at Pittsburg, Pa.

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History of the Moravian Church in Philadelphia. Ritter.
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From Charles B. Dudley, Ph.D., Altoona, Pa.

The Chemical Composition and Physical Properties of Steel Rails. C. B. Dudley, Ph.D.

From Lehigh Junto.

Household Year Book. 1835.
Mission Conference at Liverpool. 1860.
Soldiers' National Cemetery.
Willett's Geography.
The West. James Hall.
Twelve Christian Songs. Lyons.
Episcopacy. Bedell.

From Hon. George W. Childs, Philadelphia, Pa.

"Public Ledger," for the year.

From Chas. E. Warburton, Philadelphia, Pa.

"The Evening Telegraph," for the year.

From U. S. Patent Office.

"Official Gazette," for the year.
Annual Report. 1878.

From David A. Williams, Proprietor, New York.

The "Iron Age," for the year.

From James M. Swank, Sec'y, Philadelphia.

"Bulletin of the American Iron and Steel Association," for the year.

From R. Accademia dei Lincei, Rome.

Atti. 1878–79.

From Review Publishing and Printing Co., Philadelphia.

"American Exchange and Review," for the year.

From "The Sheltering Arms," New York.

Monthly Paper for the year.

From Edmund Randall, Editor and Proprietor, Catasauqua, Pa.

"The Catasauqua Dispatch," from Oct. 25th, 1879.

From E. H. Rauch, Editor and Publisher, Mauch Chunk, Pa.

"Carbon County Democrat," from June 21st, 1879.

From the Youngstown Printing Company, Youngstown, Ohio.

"Register and Tribune," Weekly Edition, for the year.

From Editorial Committee, St. Michael's College, Portland, Oregon.

"The Archangel," for the year.

From the Publisher, New York.

The American Journal of Microscopy.

From Prof. W. H. Chandler.

"Illustrated Scientific News," for the year.
"The Pharmaceutical Journal," for the year.
"La Nature," for the year.
"The Chemical News," to February 28th, 1879.
"The Druggists' Circular," to April, 1879.
"The Scientific American," to April 12th, 1879.
"The Engineering and Mining Journal," to April 5th, 1879.
"The American Journal of Pharmacy," to March, 1879.
"The Journal of the Franklin Institute," to April, 1879.

TO THE MUSEUM OF NATURAL HISTORY.

From Robert A. Packer, Sayre, Pa.

4 Bird Skins: Gull, Loon, Grebe and Crane.
Case of Stuffed Birds from Rocky Mountains containing 2 Quail, 2 California Quail, 2 Pheasants, 2 Rails, and a Wood-cock.
A Sea-Horse.

From D. P. Brown, Lost Creek.

A large Coal Fossil.

From James Myers.

13 Specimens of Batrachians.

From Sport Island, St. Lawrence.

Loon, Grebe, Gull, and Great Blue Heron.

From R. Marsteller, Slatington.

33 Specimens of Toads and Snakes.

TO THE DEPARTMENT OF CHEMISTRY.

From E. P. Wilbur.

Spode Plate.
Canton Tea-pot.

From Waldron Shapleigh, A.C., New York.

108 Samples of Aniline Colors.

From Prof. C. F. Chandler, New York.

15 Samples of Aniline Colors.
30 Samples of Dye-Woods, &c.
4 lots of Silk-Cocoons.

From E. Ricksecker.

A Suite of Samples illustrating Manufacture of Bromine.

From C. W. Gray.

Specimen of Muscovite.
3 Specimens of Tobacco.

From Gillender & Co., Philadelphia.

Glass-Melting Pot.
Glass-blower's Blowpipe.
2 Specimens of Glass Mixture.

From Charles W. Abbott.

Gold Ore from Colorado.

From Allentown Tannery.

2 Samples of Leather.

From C. W. Schmick.

Alum, Methyl Alcohol, Three Marls and Brown Acetate of Lead.

From S. Rau & Co.

Russian Staple Isinglass.
Ceylon Cinnamon.
Poppy Seed.
Cassia Fistula.

From E. H. S. Bailey.

A large number of Specimens illustrating Organic Chemistry.

From W. W. Heritage, Philadelphia.

A Copper Still.

From G. H. P. Stearns.

3 Specimens of hardened-blood Knobs.

From P. DeP. Ricketts, Ph.D., New York.

Vase of Artificial Stone.

From Francis Bitting.

Specimen of Marbleized Slate.

TO THE SCHOOL OF CIVIL ENGINEERING.

From M. M. Duncan.

Union Iron Company's Book of Shapes.

From F. W. Sargent, C.E.

17 Hydrographic Charts by the U. S. Exploring Expedition. 1841.
2 Hydrographic Charts by the U. S. Pacific Surveying Expedition. 1855.
23 Hydrographic Charts by British Admiralty. 1858–64.
13 Hydrographic Charts.
1 Military Map by U. S. Coast Survey. 1863.
2 Military Maps.
2 Plans of Fortifications.
1 Map of Montana.
1 Map of Central America.
1 Map of Utah.
12 Reports of Penna. R. R. Track Inspection.
1 Panel Drawing Board.

From Clark, Reeves & Co.

Illustrated Album of Bridges.

From Delaware Bridge Co.

Illustrated Album of Roofs and Bridges.

From Detroit Bridge and Iron Co.

13 Lithographic Plates of Roofs and Bridges.

From S. V. Rice, C.E.

4 Stereotomy Models.

From J. S. Cunningham, M.E.

1 Drawing Board.

From Edgemoor Iron Co.

9 Blue Drawings of Bridges.

From Prof. Mansfield Merriman.

2 Metric Rules.
1 Thermometer.

TO THE SCHOOL OF MECHANICAL ENGINEERING.

From B. E. Lehman, Esq.

Catalogue of Brass Manufactured Articles.

From Westinghouse Air-Brake Co.

Catalogue of Air-Brakes.

From Wm. Sellers & Co.

Treatise on Machine Tools.

From Toncey & Buchanan.

Pamphlet on Interlocking Switches and Signals.

From Smith, Vaille & Co.

Catalogue of Hydraulic Machinery.

From D. E. Pierce, Ph.B.

2 Large Drawing Boards.

From J. H. Paddock, M.E.

6 Indicator Diagrams.

From F. W. Sargent, C.E.

12 Sheets of Locomotive Specifications.

STUDENTS.

Clas.—Classical. E.M.—Mining Engineer.
Sci.—Scientific. Metallt.—Metallurgist.
C.E.—Civil Engineering. M.E.—Mechanical Engineering
A.C.—Analytical Chemisty.

RESIDENT GRADUATES.

Name.	School.	Address.
J. H. H. Corbin, A.C.,	A.C.,	Philadelphia, Pa.
Fitz William Sargent, C.E.,	E.M.,	Wollaston, Mass.

SENIOR CLASS.

Name.	School.	Address.
Irvin Brooke,*	C.E.,	Limerick Station.
Abram Bruner,	E.M.,	Philadelphia. 20 Saucon Hall.
Murray Morris Duncan,	E.M. & A.C.,	Washington, D. C. Fountain Hill.
Thomas Hughlett Hardcastle,	Clas.,	Easton, Md. Fountain Hill.
John Tinsley Jeter,	E.M.,	South Bethlehem. Fountain Hill.
Charles Francis King,	A.C.,	Mooers, N. Y. Birch Street.

* Died during the first term.

NAME.	SCHOOL.	ADDRESS.
George Earnest Potter,	C.E.,	Ashland, Ohio. 24 Saucon Hall.
Frederick Putnam Spalding,	C.E.,	Towanda, Pa. 14 Saucon Hall.
Leonard Blakslee Treharn,	Clas.,	Mauch Chunk. Moravia Ave.
Benjamin Russell Van Kirk,	M.E.,	Bethlehem. Church Street.
Frederic Copeland Wootten,	M.E.,	Reading, Pa. Moravia Ave.

JUNIOR CLASS.

NAME.	SCHOOL.	ADDRESS.
Charles Wallar Abbott,	C.E.,	Bethlehem. Main and Church.
William Butler,	C.E., (Special)	Chester Co., Pa. 18 Saucon Hall.
Alexander Patrick Crilly,	Clas.,	Allentown. Allentown.
Thomas Eynon, Jr.,	M.E.,	South Bethlehem. Packer Ave.
Benjamin Franklin Haldeman,	E.M.,	Philadelphia. 9 Saucon Hall.
Henry Lincoln Locke,	A.C., (Special)	West Dedham, Mass. American Hotel.
Lewis Stockton,	Clas.,	Phœnixville, Pa. 21 Saucon Hall.
Richard Benbridge Wetherill,	Clas. (Special)	La Fayette, Ind. Fountain Hill.
John Zimmele,	C.E.,	Bethlehem, 130 Moravia Ave.

SOPHOMORE CLASS.

NAME.	SCHOOL.	ADDRESS.
John Thomas Bourke,	M.E.,	Youngstown, O. 80 Brodhead Ave.
William Simon Cranz,	E.M., (Special)	Akron, Ohio. Main Street.
A. L. Dickinson,	M.E.,	East Haddam, Conn. New Street.
Timothy James Donohoe,	E.M.,	South Bethlehem. Buttonwood Street.
James Joseph Doran,	A.C.,	South Bethlehem. Fifth Street.
Louis Oscar Emmerich,	M.E.,	New York City. Fountain Hill.
Charles Weed Gray,	A.C.,	New York City. 27 Saucon Hall.
Edward Malcolm Henry,	C.E.,	Pawtucket, R. I. Main Street.
Charles Comstock Hopkins,	Sci.,	Woodhull, N. Y. Main Street.
Elmer Henry Lawall,	C.E.,	Bethlehem. Garrison Street.
Edwin Ransom Leavitt,	Clas.,	South Bethlehem. Univ. Terrace.
Richard Henry Lee, Jr.,	C.E.,	Lewiston, Pa. Brodhead Ave.
Robert Thomas Morrow, Jr.,	C.E.,	Oswego, N. Y. 47 Moravia Ave.
Conrad Reno,	Sci., (Special)	South Bethlehem. Birch Street.
Jesse Wilford Reno,	E.M.,	South Bethlehem. Birch Street.
Eugene Ricksecker,	C.E.,	Canal Dover, O. Church Street.
John Dougherty Ruff,	E.M.,	Philadelphia. Brodhead Ave.
Samuel Brenton Sickler,	C.E.,	Tunkhannock. 62 Moravia Ave.

Name.	School.	Address.
Harry Brightman Strong,	Metallt.	Cleveland, Ohio. 31 Saucon Hall.
Calvin Anderson Sweitzer,	C.E.,	West Bethlehem. 7 Broad Street.
Martin Wittmer,	E.M.,	Etna, Pa. New Street.

FRESHMAN CLASS.

Name.	Address.	Univ. Residence.
Allen Ames,	Oswego, N. Y.,	47 Moravia Ave.
Enos Keller Bachman,	Pottstown, Pa.,	12 Saucon Hall.
Walter Briggs,	Scranton, Pa.,	Broad St., W. Beth.
Elmer Ellsworth Brosius,	Lewistown, Pa.,	Brodhead Ave.
Harry Augustus Butler,	Mauch Chunk, Pa.,	Christmas Hall.
Willis Gaylord Caffrey,	Bethlehem,	New Street.
Felipe Cardenas,	Saltillo, Mexico,	Christmas Hall.
Yung Kwi Chin,	Kwong Tung, China,	15 Saucon Hall.
Headley Vicars Cooke,	Bethlehem,	77 Moravia Ave.
Frank Joseph Crilly,	Allentown,	Allentown.
Francis Wharton Dalrymple,	Lock Haven, Pa.,	24 Saucon Hall.
James Stout Dodson,	Bethlehem,	4½ Broad Street.
George Francis Duck,	Englewood, N. J.,	29 Saucon Hall.
Alfred Edmond Forstall,	New Orleans, La.,	27 Saucon Hall.
Nathaniel Oliver Goldsmith,	Glendale, Ohio,	28 Saucon Hall.
William Theo. Goodenow,	Toledo, Ohio,	13 Saucon Hall.
John Daniel Hoffman,	Bethlehem,	New Street.
George Gowan Hood,	Philadelphia,	17 Saucon Hall.
Garret Linderman Hoppes,	Bethlehem,	Eagle Hotel.
James Henry James,	Rockland, Mich.,	Birch Street.
William Dean Janney,	Baltimore, Md.,	Birch Street.

Name.	Address.	Univ. Residence.
Preston Albert Lambert,	Seidersville, Pa.,	Seidersville, Pa.
George Leighton,	Glenburn, Pa.,	62 Moravia Ave.
John Wood Leithead,	Rockland, Del.,	62 Moravia Ave.
Edwin Francis Miller,	Lionville, Pa.	
Wilson Franklin Moore,	Bethlehem,	Bethlehem.
Nelson Morrow,	Oswego, N. Y.,	47 Moravia Ave.
Thomas Nicholson, Jr.,	Johnstown, Pa.,	Fourth Street.
George Spencer Patterson,	Mahanoy City, Pa.,	5 Christmas Hall.
Richard Rembrandt Peale,	Lock Haven, Pa.,	23 Saucon Hall.
Henry Allebach Porterfield,	Emlenton, Pa.,	Birch Street.
Francis Henry Purnell,	Berlin, Md.,	Brodhead Ave.
Charles Loomis Rogers,	Syracuse, N. Y.,	62 Moravia Ave.
William Sherman Roth,	Allentown,	Allentown.
John Ruddle,	Mauch Chunk, Pa.,	28 Saucon Hall.
Barry Searle,	Montrose, Pa.,	62 Moravia Ave.
Charles Henry Stinson,	Norristown, Pa.,	33 Saucon Hall.
Robert Stinson,	Norristown, Pa.,	33 Saucon Hall.
Edward Swan,	Fernandina, Fla.,	
Charles Augustus Weakley,	York, Pa.,	62 Moravia Ave.
Fung Kai Whang,	Chih Kiang, China,	13 Christmas Hall.
Wyle Thompson Wilson,	Philadelphia,	Birch Street.
Chung Liang Wong,	Canton, China,	15 & 16 Saucon H.
José Aniceto Yznaga,	Santo Espiritu, Cuba,	Christmas Hall.

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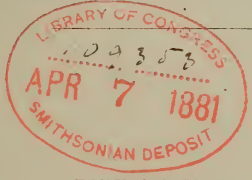
THE LEHIGH UNIVERSITY,

SOUTH BETHLEHEM, PA.,

1880-1881.

FOUNDED BY ASA PACKER.



TUITION FREE.

BETHLEHEM, PA:
H. T. CLAUDER, PRINTER.
1881.

CALENDAR.

1880-81.

1880.		
Sept. 1.	Wednesday	First Term begins.
Oct. 14.	Thursday	Founder's Day.
Nov. 25.	Thursday	Thanksgiving Day.
Dec. 22.	Wednesday	First Term ends.
1881.		
Jan. 12.	Wednesday	Second Term begins.
Feb. 22.	Tuesday	Washington's Birthday.
Mar. 2.	Ash Wednesday.	
April 14.	Thursday	Easter Holidays begin.
April 18.	Monday	Easter Holidays end.
June 6.	Monday	Annual Examinations begin.
June 17–18.	Friday and Saturday	Examinations for Admission.
June 19.	Sunday	University Sermon.
June 22.	Wednesday	Reading of Theses.
June 23.	Thursday	University Day.

1881-82.

1881.		
Sept. 5–6.	Monday and Tuesday	Examinations for Admission.
Sept. 7.	Wednesday	First Term begins.
Oct. 13.	Thursday	Founder's Day.
Nov. 24.	Thursday	Thanksgiving Day.
Dec. 21.	Wednesday	First Term ends.
1882.		
Jan. 11.	Wednesday	Second Term begins.

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The Rev. Cortlandt Whitehead, D.D.,	South Bethlehem.
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W. L. Conyngham, Esq.,	Wilkes-Barre.
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James I. Blakslee, Esq.,	Mauch Chunk.
Michael Schall, Esq.,	York.
The Rev. Marcus A. Tolman,	Mauch Chunk.
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Professor of Economic Geology.

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Professor of Mathematics and Astronomy.

W. A. LAMBERTON, A.M.,
Professor of the Greek Language and Literature.

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Professor of Civil and Mechanical Engineering.

S. RINGER, U.J.D.,
Professor of Modern Languages and Literatures and of History.

HENRY C. JOHNSON, A.M., LL.B.,
Professor of the Latin Language and Literature.

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Chaplain and Professor of Psychology, Christian Evidences and Rhetoric.

———— ————,
Professor of Mining and Geology.

---

* Will give instruction in Mining as heretofore until the vacancy in the Chair of Mining and Geology be filled.

LECTURER.

TRAIL GREEN, M.D., LL D.,
Lecturer on Physiology and Hygiene.

INSTRUCTORS.

SPENCER V. RICE, C.E.,
Instructor in Graphics and Field Work.

E. H. S. BAILEY, Ph.B.,
Instructor in Chemistry.

D. E. PIERCE, C.E.,
Instructor in Civil and Mechanical Engineering.

A. E. MEAKER, C.E.,
Instructor in Mathematics.

A. W. STERNER,
Clerk to Director of the Library.

STUDENTS.

Clas.—Classical Course. C.E.—Civil Engineering.
Sci.—Scientific Course. E.M.—Mining Engineering.
Tech.—Technical Courses. M.E.—Mechanical Engineering.
A.C.—Analytical Chemistry.

GRADUATES.

Joseph Wright Adamson, C.E.,	Philadelphia.
Abram Bruner, E.M.,	Bethlehem.
Thomas Hughlett Hardcastle, B.A.,	Easton, Md.
Harvey Stever Houskeeper, B.A.,	South Bethlehem.
Leonard Blakslee Treharn, B.A.,	Mauch Chunk.

SENIOR CLASS.

	School.	Residence.
Charles Wallar Abbott,	C.E.,	Bethlehem.
William Simon Cranz,	A.C.,	Akron, O.
Alexander Patrick Crilly,	Clas.,	Allentown.
Thomas Morgan Eynon, Jr.,	M.E.,	South Bethlehem.
Charles Weed Gray,	A.C.,	New York City.
Benjamin Franklin Haldeman,	E.M.,	Philadelphia.
Lewis Stockton,	Clas.,	Phœnixville.

JUNIOR CLASS.

	School.	Residence.
Edward Malcolm Henry,	C.E.,	Pawtucket, R. I.
Charles Comstock Hopkins,	Sci.,	Woodhull, N. Y.
Elmer Henry Lawall,	C.E.,	Bethlehem.

	School.	Residence.
Robert Thomas Morrow, Jr.,	C.E.,	Oswego, N. Y.
Eugene Ricksecker,	C.E.,	Canal Dover, O.
John Dougherty Ruff,	E.M.,	Philadelphia.
Samuel Brenton Sickler,	C.E.,	Tunkhannock.
Martin Wittmer,	E.M.,	Etna.

SOPHOMORE CLASS.

	School.	Residence.
Enos Kellar Bachman,	E.M.,	Pottstown.
John Thomas Bourke,	E.M.,	Youngstown, O.
Walter Briggs,	Clas.,	Scranton.
Elmer Ellsworth Brosius,	E.M.,	Lewistown.
Harry Augustus Butler,	Sci.,	Mauch Chunk.
Hedley Vicars Cooke,	Clas.,	Bethlehem.
Francis Joseph Crilly,	Clas.,	Allentown.
Francis Wharton Dalrymple,	C.E.,	Lock Haven.
Timothy James Donahoe,	E.M.,	South Bethlehem.
James Joseph Doran,	A.C.,	South Bethlehem.
George Francis Duck,	E.M.,	Englewood, N. J.
Louis Oscar Emmerich,	E.M.,	New York City.
Alfred Edmond Forstall,	M.E.,	New Orleans, La.
Nathaniel Oliver Goldsmith,	M.E.,	Glendale, O.
William Theodore Goodnow,	C.E.,	Toledo, O.
John Daniel Hoffman,	Clas.,	Bethlehem.
George Gowen Hood,	C.E.,	Philadelphia.
Garret Linderman Hoppes,	M.E.,	Bethlehem.
James Henry James,	E.M.,	Rockland, Mich.
William Dean Janney,	C.E.,	Baltimore, Md.
Preston Albert Lambert,	Clas.,	Seidersville.
George Leighton,	C.E.,	Glenburn.
John Wood Leithead,	C.E.,	Rockland, Del.
Edwin Francis Miller,	M.E.,	Lionville.

	School.	Residence.
Wilson Franklin More,	Clas.,	Bethlehem.
Nelson Morrow,	M.E.,	Oswego, N. Y.
Thomas Nicholson, Jr.,	M.E.,	Jenkintown.
George Spencer Patterson,	E.M.,	Mahanoy City.
Richard Rembrandt Peale,	Sci.,	Lock Haven.
John Raymond Pepin,	E.M.,	New Orleans, La.
Henry Allebach Potterfield,	E.M.,	Emlenton.
Francis Henry Purnell,	C.E.,	Berlin, Md.
Jesse Wilford Reno,	E.M.,	Boston, Mass.
Charles Loomis Rogers,	M.E.,	Utica, N. Y.
John Ruddle,	M.E.,	East Mauch Chunk.
Barry Searle,	Sci.,	Montrose.
Charles Henry Stinson,	Sci,	Norristown.
Robert Stinson,	Sci.,	Norristown.
Fung Kai Whang,	C.E.,	Ningpo, China.
Wyle Thompson Wilson,	C.E.,	Philadelphia.
Chung Liang Wong,	E.M.,	Canton, China.

FRESHMAN CLASS.

	Course.	Residence.
Warren Howard Allen,	Sci.,	Athens.
Allen Ames,	Tech.,	Oswego, N. Y.
Harrison Link Auchmuty,	Sci.,	Millersburg.
Henry Dearborn Ayres,	Tech.,	Baltimore, Md.
George Nathan Bursmith,	Tech.,	Westfield, N. J.
Yung Kwi Chin,	Tech.,	Kwong Tung, China.
Robert Grier Cooke,	Clas.,	Bethlehem.
Henry Bowman Douglas,	Tech.,	Fort Cameron, Utah.
John Roberts Engelbert,	Tech.,	Wiconisco.
Louis Focht,	Tech.,	Bethlehem.
William Banks Foote,	Tech.,	Rochester, N. Y.
William Henry Godshall,	Sci.,	Lansdale.

	Course.	Residence.
James McKinley Graeff,	Tech.,	Pottsville.
Charles Owens Haines,	Tech.,	Savannah, Ga.
Harry Tallman Harper,	Tech.,	Wiconisco.
Harry Hurd Hilligass,	Tech.,	Reading.
Edwin Franklin Hofford,	Tech.,	Lehighton.
John Andrew Jardine,	Tech.,	Alburtis.
James Warner Kellogg,	Tech.,	Atchison, Kan.
David Garrett Kerr,	Tech.,	Wilkinsburgh.
Howard Insley Kuntz,	Sci.,	Bath.
Frederick Bowman Langston, Jr.,	Tech.,	Bethlehem.
William Langston,	Tech.,	Bethlehem,
Robert Packer Linderman,	Tech.,	South Bethlehem.
David Rinehart Mehaffey,	Tech.,	Marietta.
Joseph Franklin Merkle,	Tech.,	Cressona.
Samuel Denton Morford,	Tech.,	Newton, N. J.
James Alexander Morrow,	Tech.,	Tyrone.
Harry Krider Myers,	Tech.,	Tyrone.
Albino Rosendo Nuncio,	Tech.,	Saltillo, Mexico.
James Ward Packard,	Tech.,	Warren, O.
William Frederick Detwiller Pascoe,	Tech.,	Friedensville.
William Richmond Pinckney,	Clas.,	Stateburgh, S. C.
William Sherman Roth,	Tech.,	Allentown.
Lewis Buckley Semple,	Clas.,	South Bethlehem.
Augustus Parker Smith,	Tech.,	Norwich, Conn.
Murray Stewart,	Tech.,	Reading.
Robert Daniel Stewart,	Tech.,	Lancaster.
Henry Sterner Strunk,	Sci.,	South Bethlehem.
Clinton Brazil Van Tuyl,	Tech.,	Rio de Janeiro, Brazil.
Richard Washington Walker,	Tech.,	Barneston.
James Angus Watson,	Tech.,	Catonsville, Md.
De Forest Curtis Williams,	Tech.,	Bennington, Vt.
Rollin Henry Wilbur,	Tech.,	South Bethlehem.

SPECIAL STUDENTS.

	School.	Residence.
William Hutton Blauvelt,	A.C.,	Tappentown, N. Y.
William Butler,	C.E.,	Uwchlan,
Felipè Cárdenas,	C.E.,	Saltillo, Mexico.
Charles Clemency Cook,	A.C.,	Canton, O.
John Sayre Cox.	A.C.,	Bethlehem.
George Burton Fairchild,	A.C.,	Bethel, Conn.
Charles Augustus Weakley,	C.E.,	York.

SUMMARY OF STUDENTS.

Graduates,	5
Seniors,	7
Juniors,	8
Sophomores,	41
Freshmen,	44
Specials,	7
Total,	112

The Lehigh University.

ORIGIN.

The Hon. Asa Packer of Mauch Chunk, during the year 1865, appropriated the sum of Five Hundred Thousand Dollars, to which he added one hundred and fifteen acres of land in South Bethlehem, to establish an educational institution in the rich and beautiful Valley of the Lehigh. From this foundation rose The Lehigh University, incorporated by the Legislature of Pennsylvania in 1866. In addition to these gifts, made during his lifetime, Judge Packer by his last will secured to the University an endowment of $1,500,000, and to the University Library one of $500,000.

DESIGN.

The original object of Judge Packer was to afford the young men of the Lehigh Valley a complete technical education for those professions which had developed the peculiar resources of the surrounding region. Instruction was to be liberally provided in Civil, Mechanical and Mining Engineering, Chemistry, Metallurgy, and in all needful collateral studies. French and German were made important elements in the collegiate course. A School of General Literature was part of the original plan, together with tuition in the ancient Classics. The Institution was freely opened to pupils from every part of the country and the world.

FREE TUITION.

It will be observed that all these educational facilities are provided without charge. Through the generosity of the Founder, the Trustees

were enabled, in 1871, to declare tuition FREE in all branches and classes. The Lehigh University is open to young men of suitable talents and training from every part of our own land and of the world. To this fact the attention of the pupils of our public schools and of the graduates of classical institutions is specially called. Thus is offered, *without charge*, every facility for studying the professions of the Civil, Mechanical and Mining Engineer, and of the Metallurgist and Analytical Chemist. In the Classical and Scientific departments of the School of General Literature instruction is given to those who wish to become lawyers, clergymen, physicians, editors, or merchants.

PUBLIC WORSHIP.

Prayers are held in the Chapel every morning, and all the students are required to be present.

Divine Service is held on every Sunday morning, according to the forms of the Protestant Episcopal Church, in the Chapel of the University. Attendance at this service is required of every student, except in case of those connected with other religious bodies, to whom the President will grant permission at the beginning of each term (if requested by the parent or guardian, or by the student himself if he be 21 years of age) to attend during that term the place of worship of the body with which he is connected, where attendance on Sunday morning will be required.

SITE.

The situation of the Institution is healthful and beautiful. The region is famous for its railway and manufacturing enterprises, it possesses some of the richest iron and coal mines in our land, it is accessible to the great mechanical works of New York and Philadelphia, and thus gives the students rare facilities for confirming the teachings of the recitation room by the observation of the eye.

COMMUNICATIONS.

The University Buildings are about a half-mile from the depot, at the junction of the Lehigh Valley and North Pennsylvania Railroads. New York is ninety-two, and Philadelphia fifty-four miles distant.

BUILDINGS.

Packer Hall, named after the Founder, stands seven hundred feet back of Packer Avenue, at the base of the Lehigh Mountain. Built of handsome stone, it presents to the north a noble and imposing front. At the western extremity is a belfry tower containing the President's room and the archive room. The eastern end is a large advanced wing in which are lecture and recitation rooms, and also a thoroughly equipped chemical laboratory. The central portion, eighty feet long, contains the Chapel, Drawing Room and Cabinets. To the east of Packer Hall stands the University Library, erected by the Founder in memory of Mrs. Lucy Packer Linderman, his daughter. To the west, within the grounds, are the houses of the President and Professors, comporting in architecture with Packer Hall. Fronting on Packer Avenue stand Christmas Hall and Saucon Hall, commodious brick edifices, containing students' rooms, heated by steam and lighted by gas, and a mess hall. Near Broadhead Avenue is the Sayre Observatory, the gift of Robert H. Sayre, Esq., of South Bethlehem, containing an equatorial and a zenith telescope, transit instrument and astronomical clock.

EXPENSES.

Tuition is FREE in all branches and classes. Books, materials, paper, pencils, chemical materials used in the analytical laboratory, and drawing instruments, are furnished by the student.

Rooms and board are provided in the University buildings, under the following rules:

1. The amount of room-rent, board, &c., for each term, must be paid in advance to the Treasurer of the Executive Committee, who will furnish the student with board ticket and key of room.

2. The charge for board and room-rent shall be $5 per week. Where two students occupy a room jointly, the charge shall be $4.50 per week for each.

3. The charge for board without room shall be $4 per week. The charge for room without board shall be $2 per week for each room.

4. These prices include gas and heat.

5. Meal tickets will be furnished by the steward to students or friends visiting them, at 50 cents each, payable in advance to the steward.

6. The choice of rooms shall be in the order of the classes; in any class the first applicant to have the first choice.

7. Students may retain their rooms from year to year by giving notice of their intention so to do at the close of the academic year, and by procuring their tickets therefor on or before the first day of the next term.

8. Students are required to keep their rooms in order, or to employ some proper person to do so for them.

9. No furniture for rooms will be provided by the University.

10. The use of kerosene, coal oil or burning fluid, in any of the buildings, is prohibited.

NOTE.—Where clubs are formed the cost of board need not exceed $3.50 per week.

The following is an estimate of the necessary expenses for the collegiate year, clothing and traveling not included.

Board for 40 weeks . . .	from $140 to $180
Room rent, with fuel and lights .	40 " 80
Care of room and use of furniture . .	5 " 20
Washing and incidentals . . .	15 " 25
Books, stationery, etc. . . .	20 " 40
Total . . .	$220 to $345

ADMISSION OF STUDENTS.

Application for admission into the University should be made to the President, from whom all information may be obtained.

REGULAR STUDENTS.

All applicants for regular standing in the classes or schools must be prepared to pass an examination according to the programme of studies. From this it will be seen that a student may be admitted at any time if able to pass a satisfactory examination in the studies already pursued by his class. The only exception will be in the case of a young man who is very nearly but not thoroughly prepared to enter in full standing and who may, at the discretion of the Faculty, be admitted conditionally, to make up his deficiencies by extra study. When they are made up, he will be received in full standing into his class.

SPECIAL STUDENTS

May enter, selecting such studies as they please, upon a satisfactory examination, with the sanction of the Faculty.

RESIDENT GRADUATES.

Graduates who desire to pursue their studies under the direction of the Faculty, may attend the lectures in any of the Departments. Although not bound by University hours, they will be required to obey the directions of the President and of the Professors in reference to their departments, and will have their names placed upon the Annual Register.

REQUIREMENTS FOR ADMISSION.

All candidates for admission to the Freshman Class or to any special course must be at least sixteen years of age, must present testimonials of good moral character, and pass satisfactory examinations in the following subjects:

1. *English Grammar*, including Orthography and Syntax.
2. *Geography*, political and physical. In physical, Mitchell's or Guyot's or equivalent.
3. *United States History.*
4. *Arithmetic*, including the metric system of weights and measures.
5. *Algebra*, through equations of the second degree.
6. *Chauvenet's Geometry*, or Davies' Legendre, six books, (Chauvenet preferred.)

Candidates for the Classical Course are examined also in

7. *Latin Grammar*, (Harkness or Allen and Greenough preferred.)
8. *Cæsar*, four books of the Gallic war.
9. *Cicero*, six orations, including the four against Cataline.
10. *Virgil*, first six books of the Aeneid, including Prosody; *Bucolics.
11. *The translation, at sight, of passages from Cicero or Cæsar.
12. *The translation of English into Latin. (As special importance is given this part of the examination, it is suggested to teachers that they connect exercises in making Latin, both oral and written, with all the studies of the preparatory course.)

13 **Roman History*, Creighton's Primer of Roman History is suggested as indicating the amount required.

14. *Greek Grammar*, (Goodwin's preferred.)

15. *Xenophon*, Anabasis, four books.

16 *Homer*, Iliad, three books, including prosody.

17. *The translation at sight of a passage from some work of Xenophon.

18. **Greek History*, Fyffe's Primer of Greek History is suggested.

19. *Writing Greek with accents.

The pronunciation of Greek according to the written accents is followed in the University and it is desirable that students preparing to enter be taught this system

* Subjects marked with an asterisk will not be required until the examination in June, 1882.

PROGRAMME OF STUDIES,

SHOWING THE NUMBER OF HOURS AND EXERCISES PER WEEK FOR EACH SUBJECT, AND THE TEXT-BOOKS USED.

The following is presented as the general programme of instruction, subject to such modifications from time to time as the Faculty may deem expedient, with the approval of the Trustees.

The names of the text-books studied are also generally mentioned. The number of exercises per week in each subject is indicated by the figure in parenthesis immediately following.

Two hours of Drawing, three of work in the Laboratory, or three of practice in the field, are regarded as equivalent to a recitation or lecture of one hour's duration.

THE SCHOOL OF GENERAL LITERATURE.

This school is intended to correspond to the course long established in our older colleges, modified by the needs and requirements of modern culture. Its object is to impart a comprehensive and liberal education to those who design to enter upon professional rather than technical pursuits.

It comprises two distinct courses: I. The Classical Course. II The Scientific Course.

THE CLASSICAL COURSE.

This course is chiefly designed for those who propose to study Law and Theology; it includes full and rigorous instruction in the Ancient Classics, in Elementary Science and in General Literature. The study of Mathematics in this course embraces Algebra, Geometry, Trigonometry, Analytical Geometry, and the Calculus. The programme includes Physics, Chemistry and Elementary Mechanics. There are also full courses in History, in the Science of Language and in the origin and growth of the English Language. There are also lectures on Psychology, the Christian Evidences, International and Constitutional Law and Political Economy. Lectures on English Literature are supplemented by critical readings of the standard English authors. The graduate in this course obtains the degree of B. A. (Bachelor of Arts).

FRESHMAN CLASS.

FIRST TERM.

Latin.—Livy. Latin prose composition. Leighton's History of Rome to Chap. XXX. (4)

Greek.—Homer: Odyssey. Prosody. Testament. Smith's Greek History. (4)

History.—Weber's Outlines of History. (2)

Mathematics.—Chauvenet's Geometry (completed). (4)

Essays and Declamations. (1)

Physiology and Health.—Lectures.

SECOND TERM.

Latin.—Cicero: Essays and Letters. Horace: Odes and Epodes. Latin Prosody. Leighton's Rome to Chap. LVII. (4)

Greek.—Xenophon: Memorabilia of Socrates. Testament. Smith's Greek History. (4)

History.—Weber's Outlines of History. (2)

Mathematics.—Olney's University Algebra, Part III. (3) Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (2)

Essays and Declamations. (1)

Physiology and Health.—Lectures.

SOPHOMORE CLASS.

FIRST TERM.

Latin.—Tacitus: Agricola and Germania. Prose Composition. Roman History completed. (3)

Greek.—Felton's Greek Historians. Smith's Greek History. (4)

English.—Coppée's English Literature. (4)

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

Essays and Original Orations. (1)

SECOND TERM.

Latin.—Quintilian: Book X. Horace: Satires and Epistles. Bender's Roman Literature. (4)

Greek.—Euripides: Medea. Greek Antiquities. (3)

Rhetoric.—Coppée's Rhetoric. (2)

English.—Lectures on the Science of Language. Müller and Farrar. (2)

Mathematics.—Differential and Integral Calculus: Olney. (4)

Essays and Original Orations. (1)

JUNIOR CLASS.

FIRST TERM.

Latin.—Plautus and Terence. Wilkin's Roman Antiquities. (3)

Greek.—Sophocles: Electra. (2)

History.—Lectures. (4)

Logic.—Coppée's Logic. (3)

Fine Arts.—Lectures. (1)

Physics.—Mechanics, with Lectures and Laboratory Practice. (2)

Essays and Original Orations. (1)

SECOND TERM.

Latin.—Juvenal and Persius. Select Epistles of Pliny. Cruttwell's History of Roman Literature. (2)

Greek.—Aristophanes: Clouds. Greek Literature. (2)

History.—Lectures on the Philosophy of History. (2)

English.—Lectures on the English Language. Schele de Vere. (1)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

Physics.—Galvanism, Acoustics, Light; with Lectures and Laboratory Practice. (5)

Essays and Original Orations.—(1)

SENIOR CLASS.

FIRST TERM.

Latin.—Horace: Ars Poetica. Lucretius, with Lectures. Roman Literature continued. (2)

Greek.—Theocritus. Greek Literature. (2)

Christian Evidences.—Lectures. (1)

International Law and History.—Lectures. (1)

English Literature and History.—Lectures. (3)

Descriptive Astronomy.—Loomis' Treatise, with Lectures. (3)

Physics.—Heat, Meteorology, Barometrical Leveling and Measurement of Heights, Magnetism and Statical Electricity. Lectures with Laboratory Practice. (3)

Essays and Original Orations.—(1)

SECOND TERM.

Latin.—Select Poems from lyric, elegiac and epigrammatic poets. Cicero de Officiis with lectures. Roman Literature completed. (3)

Greek.—Demosthenes: Public Orations. Greek literature. (2)

Psychology and Christian Evidences.—Lectures. (2)

Political Economy.—Lectures. (1)

Constitutional Law and History.—Lectures. (2)

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (3)

Geology.—Lectures. Dana. (2)

Preparation of Theses.

THE SCIENTIFIC COURSE.

This course comprises most of the studies of the Classical Course, and is chiefly intended for those who do not desire to study Latin and Greek. These being omitted, extended instruction is given in French and German, and in the sciences.

This Course will be particularly valuable to those who design to enter upon commercial pursuits, or matters of general industry. The degree of B. Sc. (Bachelor of Science) is conferred upon the graduate in this course.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Chauvenet's Geometry, (completed). (4)

French.—Fasquelle's Introductory French Course. Gibert's second French Reader. (3)

German.—Otto's Grammar. Writing in German Text. Translation into English. (4)

History.—Weber's Outlines of History. (2)

Drawing.—Elementary projections, shading and lettering. (2)

Essays and Declamations. (1)

Physiology and Health —Lectures.

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. (3) Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables (2)

French.—Languillier's and Monsanto's Practical French Course. Chouquet's First Readings from Modern French writers. (3)

German.—Otto's Grammar. Schlegel's second Classical German Reader. (2)

History.—Weber's Outlines of History. (2)

Drawing.—Projection drawing, with practical problems. (2)

Essays and Declamations. (1)

Physiology and Health.—Lectures.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

French.—Languillier's and Monsanto's Practical French Course. Chouquet's First Readings from Modern French writers. Practical Exercises in Translation from French into English. (3)

German.—Otto's German Grammar. Schlegel's second Classical Reader. Practical Exercises in Translation from German into English. (3)

English —Coppée's English Literature. (4)

Essays and Declamations. (1)

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry.—General Orthographic Projections, with practical problems: Church. (3)

French.—Poitevin: Grammaire Élémentaire, in French. Written Exercises. Chapsal: Leçons et Modèles de Littérature Française. (2)

German.—Scientific Readings. Exercises. (2)

Rhetoric.—Coppée's Rhetoric. (2)

English.—Lectures on the Science of Language. Müller and Farrar. (2)

Essays and Original Orations. (1)

JUNIOR CLASS.

FIRST TERM.

Physics.—Mechanics, with Lectures and Laboratory Practice. (2)

Anatomy and Physiology.—Lectures. (1)

French.—Poitevin, continued. Exercises. Systematic Scientific Readings. Chapsal continued. (2)

German.—Systematic Scientific Readings. Translation from German into English. Compositions in German. (2)

History.—Lectures. (4)

Logic.—Coppée's Logic. (3)

Fine Arts.—Lectures. (1)

Essays and Original Orations. (1)

SECOND TERM.

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

Physics.—Galvanism, Acoustics, Light: with Lectures and Laboratory Practice. (5)

French.—Systematic Readings. Composition. Damogeot: Littérature Française. (2)

German.—Systematic Scientific Readings. Compositions. Translations. Scherr: Geschichte der deutschen Literatur. (2)

History.—Lectures on the Philosophy of History. (2)

English.—Lectures on the English Language. Schele de Vere. (1)

Essays and Original Orations. (1)

SENIOR CLASS.

FIRST TERM.

Physics.—Heat, Magnetism and Statical Electricity. With Lectures and Laboratory Practice. (3)

Descriptive Astronomy.—Loomis' Treatise, with Lectures. (3)

Chemistry.—Lectures. (2)

Crystallography.—Lectures with Practical Exercises in the Determination of Crystals. (2)

Christian Evidences.—Lectures. (1)

International Law.—Lectures. (1)

English Literature and History—Lectures. (3)

Essays and Original Orations.—(1)

SECOND TERM.

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (3)

Mineralogy.—Descriptive and Determinative, with Practice. E. S. Dana. (3)

Surveying.—Land Surveying. Gillespie. (3)

Geology.—Lectures. Dana's Treatise. (2)

Psychology and Christian Evidences.—Lectures. (2)

Political Economy.—Lectures. (1)

Constitutional Law and History.—Lectures. (2)

Preparation of Theses.

TECHNICAL COURSES.

The first three terms (one year and a half) have the same curriculum of studies for all the Technical Schools. At the end of that time the student selects his school and follows the programme laid down for that School.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Chauvenet's Geometry, (completed). (4)

Physics.—Mechanics, with Lectures and Laboratory Practice. (2)

French.—Fasquelle's Introductory French Course. Gibert's second French Reader. (3)

German.—Otto's Grammar. Writing in German Text. Translation of German into English. (4)

Drawing.—Elementary projections, shading and lettering. (2)

Essays and Declamations. (1)

Physiology and Health.—Lectures.

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. (3) Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (2)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

French—Languillier's and Monsanto's Practical French Course. Chouquet's first Readings from Modern French writers. (3)

German.—Otto's Grammar. Schlegel's second Classical German Reader. (2)

Drawing.—Projection Drawing with practical problems. (2)

Essays and Declamations. (1)

Physiology and Health.—Lectures.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (5)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity, with Lectures and Laboratory Practice. (3)

French or German.—As in the Scientific Course of the School of General Literature. (3)

Essays and Original Orations. (1)

THE SCHOOL OF CIVIL ENGINEERING.

The general scope of this School comprises the higher branches of the applied mechanics and mathematics, together with the principles of construction and exercises in mapping, drawing and designing. The student is made acquainted with the strength of materials, including the theory of elasticity or flexure, the principles of con-

struction of roof-trusses, beams, girders and bridges, as well as the practical designing of such structures, the determination of their proper dimensions and the preparation of working drawings Under this head belongs also the theory of the stability of structures, including the theory of the arch and the construction of retaining walls; the principles of hydrostatics and hydraulics with their applications to vertical water wheels and turbines.

In all cases, practical examples, such as occur in actual engineering practice, are taken up and discussed, and, together with the analytical or algebraic methods, the student is also instructed in practical graphical solutions of the various problems, wherever such solutions present a special value in practice. Much time is devoted to surveying operations and to actual practice in the field. Profiles, plans of topographical surveys, contour maps, and railroad charts, are made. The practical operations connected with the reconnoissance, location and surveys of roads, canals and railroads, such as cross sectioning, setting grade stakes, laying out of curves and calculation of excavation and embankment, are fully illustrated in the field. Thorough instruction is given in drawing, the construction of working drawings of structures, topography and hydrographical charts.

Attention is also paid to the application of the general principles of the science of engineering, or to engineering considered as an art. Under this latter head may be classed the composition and qualities of materials used in construction, iron, steel, wood, stone; their dressing and preservation; foundations, earth and rock-work; harbor and river improvements, drainage, collection and distribution of water.

So much of Mechanical Engineering is necessarily included, as refers to the construction of bridges, and the special machinery and appliances used in the erection of structures.

Designs for, and reviews of, special structures, specifications and estimates of quantities and cost, and the preparation of a graduation Thesis giving evidence of satisfactory attainments, complete the course. The graduate of this School will receive the degree of C. E. (Civil Engineer.)

Graduates of the School of Civil Engineering, by remaining one year and pursuing one of the courses of studies elsewhere laid down may receive the degree of M. E. (Mechanical Engineer) or E. M. (Engineer of Mines.)

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry.—General Orthographic Projections, with practical problems. Church. (3)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles. Contour Maps. Gillespie. (3)

Civil Engineering.—Trautwine's Engineer's Pocket Book. (1)

Physics – Galvanism, Acoustics, Light: Ganot, with Lectures and Laboratory Practice. (5)

Essays.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus: Courtenay. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in General. Statics. Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Descriptive Geometry.—Warped Surfaces. Shades and Shadows. Isometric Drawing. Church. (3)

Surveying—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. (5)

Crystallography.—Lectures. (1)

Essays.

SECOND TERM.

Strength of Materials.—Theory of columns, shafts, beams, boilers, retaining walls, &c. (3)

Drawing.—Stone Cutting. Drawings of structures from actual measurements. (4)

Mine Surveying.—Practical work in a coal mine. (1)

Rail Road Surveying.—Location of a Railroad Line. Profile, Map and Estimate of Cost. (3)

Mineralogy.—Descriptive and Determinative, with Practice. E. S. Dana. (3)

Civil Engineering.—Descriptions of Engineering structures, with reports and essays. (2)

SENIOR CLASS.

FIRST TERM.

Roofs and Bridges.—Theory of strains. Investigation of stability of structures. (3)

Graphical Statics.—Analysis of roof trusses and arches. (2)

Civil Engineering.—Principles of Construction and Design. Reports on existing structures. Designs and estimates of cost. Visits of Inspection. (3)

Surveying.—Hydrography and Geodesy. (2)

Astronomy —Descriptive Astronomy: Loomis. (3)

Christian Evidences.—Lectures. (1)

English Literature and History.—Lectures. (2)

SECOND TERM.

Hydraulics.—Flow of water in pipes and rivers. Water supply engineering. (3)

Steam Engine.—The locomotive. (2)

Civil Engineering.—Specifications and Contracts. Original Designs and Estimates for Engineering Projects. Visits of Inspection. (5)

Astronomy.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescope. (2)

Geology.—Lectures. Dana. (2)

Preparation of Theses.

POST GRADUATE COURSE FOR MECHANICAL ENGINEERS FOR THE DEGREE OF CIVIL ENGINEER.

FIRST TERM.

Surveying.—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. (5)

Civil Engineering.—Principles of Construction. Erection of Structures. Reports on, and Designs for, Simple Structures. (3)

Surveying.—Hydrography and Geodesy. (2)

SECOND TERM.

Drawing. Stone Cutting. (2)

Rail Road Surveying.—Mine Surveying. Road and Railroad Sur-

veying. Location of a Railroad Line. Profile, Map and Estimate of Cost. Henck. (3)

Civil Engineering.—Original Designs and Estimates for Engineering Projects. (3)

Mine Surveying.—Practical Work in a coal mine. (1)

Astronomy.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory Work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescope. (2)

Preparation of Theses.

THE SCHOOL OF MECHANICAL ENGINEERING.

While the problems which the Civil Engineer is called upon to solve are mainly statical problems, involving the idea of rest or equilibrium, and the ends to be obtained in his constructions are stiffness, rigidity and immobility; the object of the Mechanical or Dynamical Engineer, on the other hand, is not to avoid or prevent but to cause motion, not to oppose the action of the forces of nature, but so to guide and use them as to obtain the desired results in the best manner and with the least expenditure of force and material. The two professions are thus, in the nature of the problem with which they have to do, to a certain extent antithetical. The sciences, however, of which both make use, and the fundamental principles, by the application of which the desired results are in each case obtained, are, to a considerable extent, identical.

Thus, the higher branches of the mathematics and of applied mechanics, as well as the principles of constructions, are common to both Schools. So also as regards the theory of elasticity or flexure and the strength and properties of materials. Much, therefore, of the course as already indicated for the School of Civil Engineering, finds here also a place, as will appear from an examination or the detailed course of study given below.

In the practical application of the principles common to both, however, the two Schools diverge. Thus special attention is directed to the applications of the principles of mechanics to machinery, in the construction of stationary, locomotive and marine engines, hydraulic motors of various kinds, blast furnaces and their appurtenances, foundries, rolling mills and steel works. Information is

afforded of the methods of casting and working in iron and other metals, and of making and using the tools employed in these processes.

Much attention is paid to the execution of working drawings, and the theory of mechanism. The proximity of numerous blast furnaces, rolling mills, foundries, machine shops and factories, enables the student to see the actual workings of such establishments and to obtain valuable practical information in the various branches of mechanical engineering.

Visits of inspection to the workshops, mills and blast furnaces in the neighborhood, with explanations of the machinery and tools used, form an important feature of the course.

The graduate in this School will receive the degree of M. E. (Mechanical Engineer.)

Graduates of the School of Mechanical Engineering, by remaining an additional year and pursuing the course of studies elsewhere laid down, may receive the degree of C. E. (Civil Engineer.)

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry—General Orthographic Projections, with practical problems. Church. (3)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles. Contour Maps. Gillespie. (3)

Physics.—Galvanism, Acoustics, Light: with Lectures and Laboratory Practice. (5)

Mechanical Engineering.—Machine Tools and Processes. Rose. (1)

Essays.

JUNIOR CLASS.

FIRST TERM.

Mathematics—Integral Calculus: Courtenay. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Descriptive Geometry.—Warped Surfaces. Shades and Shadows. Isometric Drawing Church. (3)

Mechanical Engineering.—Machine Drawing. Working Drawings. Pattern Making, Moulding and Casting. Rose. (5)

Crystallography.—Lectures. (1)

Essays.

SECOND TERM.

Strength of Materials.—Theory of columns, beams, shafts, boilers, retaining walls, &c. (3)

Kinematics.—Principles of Mechanism. Goodeve. (2)

Drawing.—Sketches of Machines. Working Drawings of Machinery. Elements of Machine Design. (4)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

Mechanical Engineering.—Essays upon Mechanical Topics. (1)

SENIOR CLASS.

FIRST TERM.

Roofs and Bridges.—Theory of strains. Investigation of stability of structures. (3)

Graphical Statics.—Analysis of roof trusses and arches. (2)

Mechanical Engineering.—Forging and Riveting. Workshop Appliances and Processes. Reports on, and Designs for, Simple Machines. Visits of Inspection. (3)

Thermodynamics.—General Principles. Air Engines. (2)

Astronomy.—Descriptive Astronomy: Loomis. (3)

Christian Evidences.—Lectures. (1)

English Literature and History.—Lectures. (2)

SECOND TERM.

Hydraulics.—Flow of water in pipes and rivers. Water supply engineering. (2)

Steam Engine.—The Locomotive. Proportions of the Steam Engine. (3)

Kinematics.—Link and Valve Motion. Auchincloss. (2)

Mechanical Engineering.—Specifications and Contracts. Original Designs and Estimates for Machines. Visits of Inspection. (5)

Geology.—Lectures. Dana. (2)

Preparation of Theses.

POST GRADUATE COURSE FOR CIVIL ENGINEERS FOR THE DEGREE OF MECHANICAL ENGINEER.

FIRST TERM.

Drawing.—Machine Drawing. Working Drawings. (3)

Mechanical Engineering.—Pattern Making, Molding and Casting. Forging and Riveting. Workshop Appliances and Processes. Reports on, and Designs for, Simple Machines. (5)

Thermodynamics.—Theory of Heat. Shann. (2)

SECOND TERM.

Kinematics.—Link and Valve Motion. Auchincloss. (2)

Drawing.—Sketches of Machines. Working Drawings. Elements of Machine Design. (2)

Mechanical Engineering.—Original Designs and Estimates for Machines. (3)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Preparation of Theses.

THE SCHOOL OF MINING AND METALLURGY.

The full course in this School comprises, beside the mathematical, physical, chemical and literary studies necessary to all technical education, courses in Mining, Metallurgy, Geology, Mineralogy, Machines, qualitative and quantitative Analysis, Assaying, Blow-pipe Analysis, topographical and mine Surveying and Drawing. On account of the great number and scope of the studies necessary to the completion of the full course, it is four years and a half in length.

The graduate in this School, who has taken the full course, will receive the degree of E. M. (Engineer of Mines)

A partial course may be taken in this School by those who wish to pursue the study of Metallurgy. The course of Metallurgy in-

cludes the studies of the full course, except those of Mining and Surveying. The length of the course is four years.

The graduate of this School in the Metallurgical course will receive the degree of Metallt. (Metallurgist.)

A Post Graduate course has been arranged in this School, comprising courses in Mining, Metallurgy, Chemical Analysis and Blow-pipe Analysis, with supplementary courses in Geology and Mineralogy. Graduates in the School of Civil Engineering, by remaining one year and taking this course, may obtain the degree of E. M.

In the courses of Mineralogy, Geology and Analytical Chemistry, much attention is paid to the practical instruction of the student in determining minerals by their crystallographical and physical properties, and, by the aid of blow-pipe analysis, in the determination of rocks; in the qualitative and quantitative examination of ores and metallurgical products and in the rapid methods of assaying ores by the dry and wet ways employed in metallurgical laboratories. The vicinity to the iron works of the Lehigh Valley and especially to the works of the Bethlehem Iron Company, with its blast furnaces, foundry and machine shops, and Bessemer, puddle, iron and steel rail mills, affords unusual facilities for the practical study of iron metallurgy. The processes of the manufacture of spelter and oxide of zinc may be studied at the works of the Lehigh Zinc Company. The facilities for the practical study of mining and economic geology are hardly less great. The mines of the Lehigh Zinc Company and the brown hematite and slate deposits of the Lehigh Valley are in the immediate vicinity, while within easy reach by rail are the anthracite coal fields of Pennsylvania, the iron and zinc mines of New Jersey, and the celebrated iron mines at Cornwall, Pa.

FULL COURSE IN MINING AND METALLURGY.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry.—General Orthographic Projections, with practical problems. Church. (3)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles. Contour Maps. Gillespie. (3)

Physics.—Galvanism, Acoustics, Light: with Lectures and Laboratory Practice. (5)

Blow-pipe Analysis.—Lectures and Practice. Plattner, Brush, or Nason and Chandler. (1)

JUNIOR CLASS.

FIRST TERM.

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Surveying.—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. (5)

Crystallography.—Lectures, with Practical Exercises in the Determination of Crystals. (2)

Chemical Philosophy.—Cooke. (4)

SECOND TERM.

Mine Surveying.—Practical Work in a coal mine. (1)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

Blow-pipe Analysis.—Practice. (1)

Strength of Materials.—Discussion of columns, beams, shafts, boilers, retaining walls, &c. (3)

Chemical Philosophy.—Cooke. (3)

Chemistry.—Quantitative Analysis. Laboratory Practice. (2)

SENIOR CLASS.

FIRST TERM.

Roofs and Bridges.—Theory of strains, stability of structures. (3)

Geology.—Lithology, with Practical Exercises in the Determination of Rocks. Lectures. (3)

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. Fresenius. (3)

Astronomy.—Descriptive Astronomy: Loomis. (3)

SECOND TERM.

Hydraulics.—Flow of water in pipes and rivers. Hydraulic Motors. (3)

Steam Engine.—The locomotive. (2)

Mining.—Modes of occurrence of the useful minerals. Searching for mineral deposits. Examination of mining properties. Boring. Mining tools, machines and processes. Timbering and masonry. Methods of exploitation. Callon. André. (3)

Geology.—Historic, Dynamic and Economic Geology. Dana. (3)

Astronomy.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory Work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescope. (2)

Assaying.—Including the Assay by the dry methods of gold, silver, copper, lead, iron and tin ores. Laboratory Work. Ricketts. (1)

FIFTH YEAR.

FIRST TERM.

Mining.—Underground transportation. Hoisting, drainage and pumping. Ventilation and lighting. Mechanical preparation of ores. Coal washing. Callon. André. (4)

Chemistry.—Quantitative Analysis. (6)

Christian Evidences.—Lectures. (1)

English Literature and History.—Lectures. (2)

Preparation of Theses.

COURSE IN METALLURGY.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry.—General Orthographic Projections, with practical problems. Church. (3)

Physics.—Galvanism, Acoustics, Light: Ganot, with Lectures and Laboratory Practice. (5)

Blow-pipe Analysis.—Lectures with practice. Plattner, Brush, or Nason and Chandler. (1)

Assaying.—Including the Assay by the dry methods of gold, silver, copper, lead, iron and tin ores. Laboratory Work. Ricketts. (1)

Structure Drawing.—Furnaces and Metallurgical Apparatus. (2)

JUNIOR CLASS.

FIRST TERM.

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Chemical Philosophy.—Cooke. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. Fresenius. (3)

Crystallography.—Lectures with Practical Exercises in the Determination of Crystals. (2)

Machine Drawing.—Elements of Machine Drawing. Working Drawings. (2)

SECOND TERM.

Strength of Materials.—Theory of columns, beams, shafts, boilers, retaining walls, &c. (3)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

Blow-pipe Analysis.—Practice. (1)

Chemical Philosophy.—Cooke. (3)

Kinematics.—Principles of Mechanism. Goodeve. (2)

SENIOR CLASS.

FIRST TERM.

Roofs and Bridges.—Theory of strains. (3)

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. (3)

Geology.—Lithology, with Practical Exercises in the Determination of Rocks. Lectures. (3)

Christian Evidences.—Lectures. (1)

English Literature and History.—Lectures. (2)

SECOND TERM.

Hydraulics.—Flow of water in pipes and rivers. Hydraulic Motors. (3)

Steam Engine.—The locomotive. (2)

Kinematics.—Link and Valve Motion. Auchincloss. (2)

Chemistry.—Quantitative Analysis. Laboratory Work. (4)

Geology.—Historic, Dynamic and Economic Geology. Lectures. Dana. (3)

Preparation of Theses.

POST GRADUATE COURSE FOR CIVIL ENGINEERS FOR THE DEGREE OF MINING ENGINEER.

FIRST TERM.

Mining.—Underground Transportation. Hoisting. Drainage and Pumping. Ventilation and Lighting. Mechanical Preparation of Ores. Coal Washing. (4)

Geology.—Lithology, with Practical Exercises in the Determination of Rocks. Dana. (1)

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

Chemistry.—Quantitative Analysis. Laboratory Work. (6)

Crystallography.—Practical Exercises in the Determination of Crystals. E. S. Dana. (1)

SECOND TERM.

Mining.—Modes of Occurrence of the useful minerals. Searching for mineral deposits. Examination of mining properties. Boring. Mining tools, machines and processes. Timbering and masonry. Methods of exploitation. (4)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Geology.—Historic, Dynamic and Economic Geology. Dana. (3)

Chemistry.—Quantitative Analysis. Laboratory Work. (3)

Assaying.—Including the Assay by the dry methods of gold, silver, copper, lead, iron and tin ores. Ricketts. (1)

Blow-pipe Analysis.—Practice. (2)

THE SCHOOL OF CHEMISTRY.

The course of instruction in this School continues the subject of Theoretical Chemistry from the general course of the two previous terms, the subject of Chemical Philosophy and Organic Chemistry being taught by daily recitations in the Junior and Senior years.

In Analytical Chemistry, the course of Qualitative Analysis in the first term of the second year is followed by preparation of Chemical Compounds and the purification of Chemicals.

Subsequently, Quantitative Analysis is pursued to the end of the course, including the Dry Assaying of Ores of gold, silver, copper, lead, iron and tin, and the Wet Analyses, included in the appended schedule. In addition, courses of Lectures on Medical, Agricultural and Technical Chemistry are given, and various industrial establishments in the neighborhood and in Philadelphia and New York are visited, in the company of an instructor. The course also includes thorough instruction in Physics and Mechanics, Mineralogy and Blow-pipe Analysis, Metallurgy, Geology and Descriptive Astronomy.

The last term of the Senior year is mainly devoted to the preparation of a Thesis on some subject, selected by the professor, involving practical work in the Laboratory, in addition to the literary labor, and each graduate will thus make a contribution to the progress of the science as a preliminary to the reception of his degree.

The course is thus seen to include thorough instruction in theoretical and applied chemistry, in their various branches, as well as, in those cognate sciences of such great value to the chemist.

The Laboratories are under the immediate charge of the Professor and his Assistant, and, together with the Lecture-room, are unsurpassed in excellence by any similar establishment in the country, being supplied with all the modern improvements. The collections of apparatus, specimens and models, illustrating theoretical and applied chemistry, are already important and rapidly increasing.

Students are charged for the chemicals and apparatus consumed. If the student is moderately careful, this expense need not exceed $60 per year.

The graduate of this School will receive the degree of A. C. (Analytical Chemist.)

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Descriptive Geometry.—General Orthographic Projections, with practical problems. Church. (3)

Physics.—Galvanism, Acoustics, Light: with Lectures and Laboratory Practice. (5)

Chemical Preparations.—Including the Preparation of Chemical Compounds and the Purification of Chemicals by Distillation, Sublimation, Fusion, Crystallization, Precipitation, etc. (1)

Assaying.—Including the Assay by the dry methods of gold, silver, copper, lead, iron and tin ores. Ricketts. (1)

Blow-pipe Analysis.—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

JUNIOR CLASS.

FIRST TERM.

Chemical Philosophy.—Cooke. (4)

Toxicology.—Otto on Poisons. (1)

Quantitative Analysis. — Fresenius' Quantitative Analysis. (7)

The following analyses are executed by the students:

1. Iron Wire (Fe)
2. Potassic Dichromate (Cr_2O_3)
3. Baric Chloride (Ba, Cl, H_2O)
4. Magnesic Sulphate (MgO, SO_3, H_2O)
5. Hydro Di-Sodic Phosphate (P_2O_5)
6. Bronze (Cu, Sn, Zn)
7. Rochelle Salt (K_2O, Na_2O)
8. Volumetric Determination of Chlorine.
9. Acidimetry (HCl, H_2SO_4, HNO_3)
10. Alkalimetry (KOH, NaOH, NH_4OH)

11. Chlorimetry (Bleaching Powders)
12. Silver Coin (Au, Ag, Pb, Cu)
13. Zinc Ore (Zn)

Crystallography.—Lectures, with Practical Exercises in the Determination of Crystals. (2)

Anatomy and Physiology.—Lectures. (1)

SECOND TERM.

Chemical Philosophy.—Cooke. (3)

Quantitative Analysis. — Fresenius' Quantitative Analysis. (5) The following analyses are executed by the students:

14. Copper Ore (Cu)
15. Spiegeleisen (Mn)
16. Lead Ore (PbS)
17. Ilmenite (TiO_2)
18. Iron Ore (Complete Analysis)
19. Limestone (Complete Analysis)
20. Coal (Volatile Matter,—Fixed Carbon, Ash, H_2O, S, P)
21. Slag (Complete Analysis)

Metallurgy. — Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

SENIOR CLASS.

FIRST TERM.

Organic Chemistry.—Wöhler. (4)

Quantitative Analysis. — Fresenius' Quantitative Analysis. (5) The following analyses are executed by the students:

22. Guano (NH_3, P_2O_5, H_2O)
23. Clay (Complete Analysis)
24. Manganese Ore (MnO_2)
25. Mineral Water (Complete Analysis)
26. Pig Iron (Complete Analysis)
27. Nickel Ore (Ni, Co)
28. Organic Analysis (C, H, O, N)
29. Gas Analysis (Complete Analysis of Illuminating Gas)

Astronomy.—Descriptive Astronomy: Loomis. (3)
Christian Evidences.—Lectures. (1)
English Literature and History.—Lectures. (2)

SECOND TERM.

Chemistry Applied to the Arts.—Lectures. (3)
Medical Chemistry.—Lectures. (1)
Agricultural Chemistry.—Lectures. (1)
Geology.—Historic, Dynamic and Economic Geology. Lectures. Dana. (2)
Preparation of Theses.

GRADUATING THESES.

Every student, in each of the Schools, will be required to present a thesis upon some topic connected with his special School, as a necessary portion of the exercises for his final examination for a diploma. These theses shall be accompanied by drawings and diagrams, when the subjects need such illustration. The originals will be kept by the University, as a part of the student's record, for future reference; but a copy may be retained by the student, and be published, permission being first obtained from the President.

DIPLOMAS AND CERTIFICATES.

The Diploma is given only to those who have passed all the examinations in a regular course and is signed by the President and Secretary of the Board of Trustees and by the Faculty of the University. For all partial courses a certificate is given showing what the student has accomplished, and is signed by the President and Secretary of the Faculty.

POSTGRADUATE DEGREES.

M. A.

The Faculty will recommend for the Degree of Master of Arts, candidates otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Arts, shall pursue for at least two years, at the University, a course of liberal study approved by

the Faculty, pass a thorough examination on the same, and present satisfactory theses.

Ph. D.

The Faculty will recommend for the Degree of Doctor of Philosophy, candidates otherwise properly qualified, who, after taking at this University either of the Degrees of Civil, Mechanical or Mining Engineer, or Analytical Chemist, shall pursue, for two years, at the University, a course of advanced Scientific study in the line of their profession, pass a thorough examination in the same, and present satisfactory theses.

D Sc.

The faculty will recommend for the Degree of Doctor of Science, candidates otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Science, shall pursue for at least two years, at the University, a course of Scientific study, embracing two subjects approved by the Faculty, pass a thorough examination, showing in one of the subjects special attainments, and shall present satisfactory theses in one of the subjects, based upon original scientific investigation.

Candidates for any of the above postgraduate degrees or for the postgraduate degree of Civil, Mechanical or Mining Engineer, who are not graduates of this University, must give satisfactory evidence of having fulfilled the requirements for graduation in the corresponding undergraduate course. The acceptance of a certificate as evidence of proficiency, in lieu of examination, is at the discretion of each professor as to the subjects in his department.

The requirement of residence may be omitted in special cases by the Faculty.

THE UNIVERSITY LIBRARY.

The Library Building was erected by the Founder of the University in 1877, at a cost of One Hundred Thousand Dollars, as a memorial of his daughter, Mrs. Lucy Packer Linderman, and during the same year more than Twenty Thousand Dollars were contributed by the family and friends of that estimable woman, as a memorial fund for the purchase of books. By the will of the Founder of the University a fund of $500,000 has been given for the permanent endowment of the Library.

The building is semi-circular in plan, with a handsome façade in the Venetian style of architecture. It is constructed of Potsdam sandstone with granite ornamentation. In the interior, the centre is occupied as a reading space, fifty by forty feet, from which radiate the book cases, extending from floor to ceiling; two galleries affording access to the upper cases. Shelf room is now provided for Eighty Thousand Volumes. The building is thoroughly fireproof, well lighted, and heated by steam.

Eighteen thousand volumes are now upon the shelves, including many extremely valuable works. The list of periodicals number about fifty, embracing as far as possible all departments of knowledge.

The Library is conducted strictly for consultation, and is open to the use of the public; both of which conditions are in accord with the terms of the gift.

REGULATIONS OF THE LEHIGH UNIVERSITY LIBRARY.

I. The Library is open every day, except Sundays and Legal Holidays, from 8 A. M. until 10 P. M.

II. Admission is free to all persons over 16 years of age.

III. Readers are required to write their names and addresses in the Daily Register of the Library. They also write the name of the book desired upon a Library Card, with their signatures, and present the same to the Director's Clerk, who supplies the book, retaining the card as a receipt. Before leaving the Library, readers return their books to the clerk and receive their cards.

IV. No book is permitted, under any circumstances, to be taken from the Library.

V. No person is allowed to enter the alcoves, or remove any book from the shelves, without the permission of the Director.

VI. Readers wishing to consult the more valuable illustrated works make special application for that purpose.

VII. In taking notes, pencils, and not pens and ink, are to be used.

VIII. Audible conversation and the use of tobacco are strictly forbidden in any part of the Library.

IX. Any person not conforming to these Regulations, will be denied the privileges of the Library.

X. Any person who defaces, in any way, any book, magazine or paper, or the furniture, or any portion of the building, in addition to being deprived of the privileges of the Library, will be prosecuted according to law.

OBSERVATORY.

By the liberality of Robert H. Sayre, Esq., one of the Trustees of the University, an Astronomical Observatory has been erected on the University grounds, and placed under the charge of the Professor of Mathematics and Astronomy.

In the dome of the observatory is mounted an Equatorial Telescope, of six inches aperture, by Alvin Clark & Sons. The west wing contains a superior Sidereal Clock, by Wm. Bond & Sons; a Zenith Telescope, by Blunt, and a Field Transit, by Stackpole. There is also a Prismatic Sextant, by Pistor & Martins.

Students in practical Astronomy receive instruction in the use of the instruments and in actual observation.

The grounds upon which the observatory stands, consisting of seven acres of land adjoining the original grant, was presented to the University by Charles Brodhead, Esq., of Bethlehem.

An advanced course in Astronomy and the higher Analysis has been established, requiring two years for its completion. It is adapted to the attainments of the graduates of this University, but is open to any one who may be prepared to pursue it.

This course embraces the following subjects:

First Year—Spherical Astronomy. Theory of Instruments. Method of Least Squares. Numerical Calculus.

Second Year—Celestial Mechanics. Interpolation and Quadrature. Computation of Orbits and Perturbations.

During the entire course, the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

THE CHEMICAL AND NATURAL HISTORY SOCIETY OF THE LEHIGH UNIVERSITY.

This Society was organized in the Fall of 1871, as "The Chemical Society," but was afterwards expanded, as its present title indicates,

and admits, by election, students from all departments of the University.

The collections of Chemical Preparations, and Botanical and Zoölogical Specimens belonging to the Society, are already important. During the past years persons have been sent to Texas and Brazil to collect specimens for these cabinets.

The Society has organized and maintained several courses of public scientific lectures.

Among the honorary members of the Society are more than one hundred of the most distinguished scientists in Europe and the United States.

FOUNDER'S DAY.

On the second Thursday of October of each year Commemorative Exercises are held in honor of the Founder of the University.

On Thursday, October 14th, 1880, the second celebration of Founder's Day occurred. In Packer Hall, a service, appropriate to the occasion was held and a Memorial Address was delivered by the Hon. Thomas F. Bayard, of Delaware. In the afternoon the Annual Sports of the University Athletic Association took place in the new Athletic Grounds, and in the evening there was a display of fireworks, in University Park.

WASHINGTON'S BIRTHDAY.

This day is observed as a holiday and is usually celebrated by the students in an appropriate manner.

On Monday, February 23d, 1880, exercises were held in the chapel. Washington's farewell address was read by Benjamin Franklin Haldeman of the Junior Class, an oration was delivered by Richard Benbridge Wetherill of the Sophomore Class and there was vocal music by the University Choir.

THE UNIVERSITY SERMON.

This Sermon is preached on the Sunday before University Day.

The Rev. Cyrus F. Knight, D.D., was the preacher on Sunday, June 20th, 1880, in the University Chapel.

THESIS DAY.

On the day preceding University Day, the Theses prepared by the graduating class are publicly read.

THESES OF THE CLASS OF 1880.

The Lowe Gas Process.

MURRAY MORRIS DUNCAN.

The Ars Poetica of Horace applied to four modern poets.

THOMAS HUGHLETT HARDCASTLE.

Review of methods employed in Mining Coal in Cross Creek Colliery No. 2, Drifton, Pa.

JOHN TINSLEY JETER.

The Chemical Reactions in the Bessemer Process, the Charge containing but a small percentage of Manganese.

CHARLES FRANCIS KING.

Review of Drawbridge over Cuyahoga River at Cleveland, Ohio.

GEORGE EARNEST POTTER.

Design for an Iron Highway Bridge to replace the old Lehigh Bridge at Bethlehem.

FRED PUTNAM SPALDING.

The Origin and Development of the English Constitution.

LEONARD BLAKSLEE TREHARN.

Discussion of the Hydraulic Ram.

BENJAMIN RUSSELL VAN KIRK.

On the best position for the Centre of Gravity in Express Locomotives.

FREDERICK COPELAND WOOTTEN.

THE ADDRESS BEFORE THE ALUMNI

Is delivered on the evening of Thesis Day.

His Excellency Governor Henry M. Hoyt delivered the address on the evening of June 23d, 1880, in the large Drawing Room of Packer Hall.

UNIVERSITY DAY.

This day is the last of the academic year and falls on the fourth Thursday of June. The exercises consist of orations and essays by members of the Senior Class.

The following was the order on June 24th, 1880:

Reading of Scripture and Prayer by the Right Rev. M. A. De Wolfe Howe, D.D., LL.D., Bishop of the Diocese.

Inauguration of President Lamberton.

Salutatory,

FRED. PUTNAM SPALDING.

Essay—The History and Causes of Development of the Iron Trade.

CHARLES FRANCIS KING.

Oration—The advantages of Classical learning.

LEONARD BLAKSLEE TREHARN.

Valedictory.

THOMAS HUGHLETT HARDCASTLE.

AWARD OF THE WILBUR SCHOLARSHIP

To Charles Comstock Hopkins, Woodhull, N. Y., and honorable mention of Elmer Henry Lawall, of Bethlehem, second in rank in the Sophomore Class.

The following Degrees were conferred:

E.M. upon Abram Bruner, Philadelphia.
E.M. and A.C. upon Murray Morris Duncan, Washington, D. C.
B.A. upon Thomas Hughlett Hardcastle, Easton, Md.
E.M. upon John Tinsley Jeter, South Bethlehem.
A.C. upon Charles Francis King, Mooers, N. Y.
C.E. upon George Earnest Potter, Ashland, O.
C.E. upon Fred Putnam Spalding, Towanda.
B.A. upon Leonard Blakslee Treharn, Mauch Chunk.
M.E upon Benjamin Russell Van Kirk, Bethlehem.
M E. upon Frederick Copeland Wootten, Reading.

After which the Benediction was pronounced by the Bishop.

The music upon Thesis Day and University Day was by Hassler's Orchestra.

THE WILBUR SCHOLARSHIP.

This scholarship was founded in 1872 by E. P. Wilbur, Esq., of South Bethlehem, and is the sum of $200, awarded annually to the student in the Sophomore Class having the best record.

ALUMNI ASSOCIATION

OF

THE LEHIGH UNIVERSITY.

OFFICERS.

JUNE, 1880.

PRESIDENT:

Caspar Wistar Haines.

VICE PRESIDENTS:

Richard Brodhead, Easton, Pa.
Lewis T. Wolle, Bethlehem, Pa.

SECRETARY AND TREASURER:

Arthur E. Meaker, Bethlehem, Pa.

ALUMNI REPRESENTATIVES IN THE BOARD OF TRUSTEES.

Wm. R. Butler, Mauch Chunk, Pa.
W. A. Lathrop, Wilkes-Barre, Pa.
(Term expires June, 1881.)
L. E. Klotz, Mauch Chunk, Pa.
W. H. Baker, Philadelphia, Pa.
(Term expires June, 1882.)

EXECUTIVE COMMITTEE:

Caspar Wistar Haines, *Chairman.*
Arthur E. Meaker, W. A. Lathrop,
Wm. R. Butler, L. E. Klotz,
W. H. Baker.

MEMBERS.

CLASS OF 1869.

J. H. H. Corbin, A.C., Chemist, Alamosa, Col.

Charles E. Ronaldson, M.E., Mechanical Engineer, Siemens' Regenerative Gas Furnace, 119 South Fourth Street, Philadelphia.

Miles Rock, C.E., U.S. Astronomer, Geographical Survey west of 100° meridian, 1432 Chapin Street, College Hill, Washington, D. C.

CLASS OF 1870.

* L. Preston Ashmead, A.C., M.D.

R. Brodhead, M E., Attorney-at-Law, Easton, Pa.

William R. Butler, M.E., Bookkeeper, First National Bank, Mauch Chunk, Pa.

George A. Jenkins, A.C., Superintendent Vulcan Steel Works, South St. Louis, Mo.

William J. Kerr, A.C., 2037 Mount Vernon Street, Philadelphia.

Harry E. Packer, A.C., Vice President Lehigh Valley Railroad, Mauch Chunk, Pa.

Henry B. Reed, B.A., M.D., Practicing Physician, 2300 Delancey Place, Philadelphia.

William D. Ronaldson, B.A., M.D., Practicing Physician, 4017 Locust Street, Philadelphia.

John M. Thome, C.E., Astronomer, Astronomical Observatory, Cordova, Argentine Republic.

Russel B. Yates, C.E., Belle, Lewis & Yates, Miners and Shippers of Clearfield Coal and Coke, 28 Main Street, Rochester, N. Y.

CLASS OF 1871.

J. N. Barr, M.E., Superintendent Car-Wheel Shops, P. R. R., Altoona, Pa.

Frank L. Clerc, C.E., Chemist, Lehigh Zinc Works, Bethlehem, Pa.

H. S. Drinker, E.M., Attorney-at-Law, 210 South Fourth Street, Philadelphia.

Edward F. Fasset, A.C., 1530 Walnut Street, Philadelphia.

W. H. McCarthy, B.A., New Haven, Conn.

* Deceased.

Waldron Shapleigh, A.C., Superintendent Kings Manufacturing Company, Freeport, Ill.

* C. G. Weaver, C.E.

CLASS OF 1872.

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THE REV. FREDERIC M. BIRD, A.M.,
Chaplain and Professor of Psychology, Christian Evidences and Rhetoric.

EDWARD H. WILLIAMS, JR., E.M., A.C.,
Professor of Mining and Geology.

J. F. KLEIN, D.E.,
Professor of Mechanical Engineering.

LECTURER.

TRAILL GREEN, M.D., LL.D.,
Lecturer on Physiology and Hygiene.

INSTRUCTORS.

SPENCER V. RICE, C.E.,
Instructor in Drawing and Civil Engineering.

E. H. S. BAILEY, Ph.B.,
Instructor in Chemistry.

A. E. MEAKER, C.E.,
Instructor in Mathematics.

LESTER P. BRECKENRIDGE, Ph.B.,
Instructor in Drawing and Mechanical Engineering.

A. W. STERNER,
Clerk to Director of the Library.

STUDENTS.

Clas.—Classical Course. C.E.—Civil Engineering.
Sci.—Scientific Course. E.M.—Mining Engineering.
Tech.—Technical Courses. M.E.—Mechanical Engineering.
A.C.—Analytical Chemistry.

GRADUATES.

Charles Weed Gray, A.C.,	New York City.
Benjamin Franklin Haldeman, E.M.,	Philadelphia.
Thomas Hughlett Hardcastle, B.A.,	Easton, Md.
Leonard Blakslee Treharn, B.A.,	Reading.

SENIOR CLASS.

	Course.	Residence.
Charles Comstock Hopkins,	Sci.,	Woodhull, N. Y.
Elmer Henry Lawall,	C.E.,	Bethlehem.
Robert Thomas Morrow, Jr.,	C.E.,	Oswego, N. Y.
Eugene Ricksecker,	C.E.,	Canal Dover, O.
John Dougherty Ruff,	E.M.,	Philadelphia.
Samuel Brenton Sickler,	C.E.,	Tunkhannock.
Martin Wittmer,	E.M.,	Etna.

JUNIOR CLASS.

	Course.	Residence.
Enos Kellar Bachman,	E.M.,	Pottstown.
Walter Briggs,	Clas.,	Scranton.
Harry Augustus Butler,	Sci.,	Mauch Chunk.
Hedley Vicars Cooke,	Clas.,	Bethlehem.
Francis Joseph Crilly,	Clas.,	Allentown.
Francis Wharton Dalrymple,	C.E.,	Lock Haven.
Timothy James Donahoe,	E.M.,	South Bethlehem.
James Joseph Doran,	A.C.,	South Bethlehem.

	Course.	Residence.
George Francis Duck,	E.M.,	Englewood, N. J.
Louis Oscar Emmerich,	E.M.,	New York City.
Alfred Edmond Forstall,	M.E.,	New Orleans, La.
Nathaniel Oliver Goldsmith,	M.E.,	Glendale, O.
John Daniel Hoffman,	Clas.,	Bethlehem.
George Gowen Hood,	C.E.,	Philadelphia.
Garret Linderman Hoppes,	C.E.,	Bethlehem.
Preston Albert Lambert,	Clas.,	Seidersville.
John Wood Leithead,	C.E.,	Rockland, Del.
Edwin Francis Miller,	M.E.,	Lionville.
Wilson Franklin More,	Clas.,	Bethlehem.
Nelson Morrow,	M.E,	Oswego, N. Y.
Thomas Nicholson, Jr.,	M.E.,	Jenkintown.
George Spencer Patterson,	E.M.,	Mahanoy City.
Richard Rembrandt Peale,	Sci.,	Lock Haven.
Henry Allebach Porterfield,	E.M.,	Emlenton.
Francis Henry Purnell,	C.E.,	Berlin, Md.
Jesse Wilford Reno,	E M.,	Boston, Mass.
Charles Loomis Rogers,	M.E.,	Greene, N. Y.
John Ruddle,	M.E.,	East Mauch Chunk.
Charles Henry Stinson,	Sci.,	Norristown.
Robert Stinson,	Sci ,	Norristown.

SOPHOMORE CLASS.

	Course.	Residence.
Allen Ames,	M.E.,	Oswego, N. Y
Harrison Link Auchmuty,	C.E.,	Millersburg.
Elmer Ellsworth Brosius,	E.M.,	Lewistown.
Robert Grier Cooke,	Clas.,	Bethlehem.
Henry Bowman Douglas,	E.M.,	Fort Cameron, Utah.
John Roberts Engelbert,	C.E.,	Wiconisco.
William Banks Foote,	E.M.,	Rochester, N. Y.
William Theodore Goodnow,	C.E.,	Toledo, O.
Charles Owens Haines,	M.E.,	Savannah, Ga.
Harry Tallman Harper,	C.E.,	Wiconisco.
Harry Hurd Hillegass,	C.E.,	Reading.
Edwin Franklin Hofford,	C.E.,	Lehighton.

	Course.	Residence.
John Andrew Jardine,	E.M.,	McCainsville, N. J.
James Warner Kellogg,	A.C.,	Atchison, Kan.
David Garrett Kerr,	E.M.,	Wilkinsburgh.
Frederick Bowman Langston, Jr.,	C.E.,	Bethlehem.
William Langston,	C.E.,	Bethlehem.
Robert Packer Linderman,	C.E.,	South Bethlehem.
Joseph Franklin Merkle,	C.E.,	Cressona.
Samuel Denton Morford,	M.E.,	Newton, N. J.
James Alexander Morrow,	C.E.,	Tyrone.
Harry Krider Myers,	C.E.,	Tyrone.
Albino Rosendo Nuncio,	M.E.,	Saltillo, Mexico.
James Ward Packard,	M.E.,	Warren, O.
Alfred Scull Reeves,	E.M.,	Phœnixville.
Barry Searle,	A.C.,	Montrose.
Lewis Buckley Semple,	Clas.,	South Bethlehem.
Augustus Parker Smith,	M.E.,	Norwich, Conn.
Murray Stewart,	E.M.,	Reading.
Robert Daniel Stewart,	A.C.,	Lancaster.
Richard Washington Walker,	C.E.,	Barneston.
James Angus Watson,	C.E.,	Catonsville, Md.
Wyle Thompson Wilson,	C.E.,	Philadelphia.

FRESHMAN CLASS.

	Course.	Residence.
Warren Howard Allen,	Sci.,	Athens.
Mark Anthony,	Tech.,	Linglestown.
Leighton Irvin Baldwin,	Tech.,	Mahanoy City.
John Peter Baldy.	Tech.,	Danville.
William Lowrey Beverson,	Tech.,	York.
Theodore Weld Birney,	Tech.,	Washington, D. C.
Wilson Henry Boehm,	Tech.,	Seidersville.
William Smith Campbell,	Tech,	Delano.
Harry Jefferson Cowan, A.B.,	Tech,	Danville, Ky.
William Harvey Cooke,	Clas,	Bethlehem.
Joseph deCueto,	Tech.,	Asturias, Spain.
William Clarke Edgett,	Tech.,	Westerly, R. I.
William Noble Edson,	Tech.,	Clifton Springs, N. Y.

	Course.	Residence.
Max Bernhard Feldmann,	Tech.,	Philadelphia.
Julian Hazlehurst Fleming,	Tech.,	Augusta, Ga.
Louis Focht,	Tech.,	Bethlehem.
William Henry Godshall,	Sci.,	Lansdale.
George Ambrose Gowland,	Tech.,	Phillipsburg.
James McKinley Graeff,	Tech.,	Pottsville.
Charles Graham, Jr.,	Tech.,	Kingston.
William Henry Heiser,	Tech.,	Mt. Carmel.
James Monroe Hess,	Tech.,	Bethlehem.
Mark Antony DeWolfe Howe, Jr.,	Clas.,	Reading.
Harry Oberly Jones,	Sci.,	Freemansburg.
Elmer Lewis Kellogg,	Tech.,	Chicago, Ill.
John Myron Kellogg,	Tech.,	Liberty Corner.
Howard Insley Kuntz,	Tech.,	Bath.
Edward Langston,	Tech.,	Bethlehem.
Rudolph Earnest Leonhard,	Tech.,	Paterson, N. J.
Edward Morton McIlvaine,	Tech.,	Reading.
James Lorraine McLenegan,	Tech.,	Reading.
David Rinehart Mehaffey,	Tech.,	Marietta.
John Francis Mengle,	Tech.,	McIlhaney.
Arnon Permin Miller,	Tech.,	South Bethlehem.
Eben Miltimore Morgan,	Tech.,	Reading.
David Kirk Nicholson,	Tech.,	Jenkintown.
John Wesley Peale,	Tech.,	Lock Haven.
Henry Drinker Peet,	Tech.,	Newport, R. I.
Fayette Brown Petersen,	Tech.,	Washington, D. C.
Francis William Birchal Pile,	Tech.,	London, England.
John Bertsch Price,	Tech.,	Upper Lehigh.
George Reginald Radford,	Tech.,	Washington, D. C.
Byron Elmer Rhoads,	Tech.,	Lake.
Michael Alton Richards,	Tech.,	Bethlehem.
William Sherman Roth,	Tech.,	Allentown.
Harry William Rowley,	Tech.,	South Bethlehem.
Alexander Provost Shaw,	Tech.,	Washington, D. C.
Artherholt Smith,	Tech.,	Larimer.
Elliot O Smith,	Tech.,	Maquoketa, Iowa.
Francis Timothy Smith,	Tech.,	Simsbury, Conn..
George Washington Snyder,	Tech.,	Pottsville.

	Course.	Residence
William John Snyder,	Tech.,	Catasauqua.
Thomas Broomal Temple,	Tech.,	Lionville.
John Milton Thatcher,	Tech.,	Westport, Mo.
Charles Elihu Thomas,	Tech.,	Pottstown.
Clarence Moncure Tolman,	Tech.,	Washington, D C.
John Wagner,	Tech.,	South Bethlehem.
Elmer Kern Weller,	Tech.,	Trexlertown.
James Hollis Wells,	Tech.,	Bethlehem
Cabell Whitehead,	Tech.,	Amherst, Va.
Rollin Henry Wilbur,	Tech.,	South Bethlehem.
Hugh Washington Wilson,	Tech.,	Washington.
John Kern Wolfe,	Tech.,	Philadelphia.
Samuel Saylor Woolever,	Tech.,	Allentown.
Howard William Yoder,	Tech.,	Mahanoy City.
Charles Frederick Zimmele,	Sci.,	Bethlehem.

SPECIAL STUDENTS.

	Course.	Residence.
Charles Clemency Cook,	A.C.,	Canton, O.
Julian de Bruyn Kops, B.E.,	C.E.,	Savannah, Ga.
Charles Augustus Weakley,	C.E.,	York.
William Howard Wilmarth, B.S.,	E.M.,	Attleborough, Vt.

SUMMARY OF STUDENTS.

Graduates,	4
Seniors,	7
Juniors,	30
Sophomores,	33
Freshmen,	66
Specials,	4
Total,	144

THE LEHIGH UNIVERSITY.

ORIGIN.

The Hon. ASA PACKER of Mauch Chunk, during the year 1865, appropriated the sum of Five Hundred Thousand Dollars, to which he added one hundred and fifteen acres of land in South Bethlehem, to establish an educational Institution in the rich and beautiful Valley of the Lehigh. From this foundation rose THE LEHIGH UNIVERSITY, incorporated by the Legislature of Pennsylvania in 1866. In addition to these gifts, made during his lifetime, Judge Packer by his last will secured to the University an endowment of $1,500,000, and to the University Library one of $500,000.

DESIGN.

The original object of Judge Packer was to afford the young men of the Lehigh Valley a complete technical education for those professions which had developed the peculiar resources of the surrounding region. Instruction was to be liberally provided in Civil, Mechanical and Mining Engineering, Chemistry, Metallurgy, and in all needful collateral studies. French and German were made important elements in the collegiate course. A School of General Literature was part of the original plan, together with tuition in the ancient Classics. The Institution was freely opened to pupils from every part of the country and the world.

FREE TUITION.

It will be observed that all these educational facilities are provided without charge. Through the generosity of the Founder, the Trustees were enabled, in 1871, to declare tuition FREE in all branches and classes. The Lehigh University is open to young men of suitable

talents and training from every part of our own land and of the world. To this fact the attention of the pupils of our public schools and of the graduates of classical institutions is especially called. Thus is offered *without charge*, every facility for studying the professions of the Civil, Mechanical and Mining Engineer, and of the Metallurgist and Analytical Chemist. In the Classical and Scientific departments of the School of General Literature instruction is given to those who wish to become lawyers, clergymen, physicians, editors, or merchants.

PUBLIC WORSHIP.

Prayers are held in the Chapel every morning and all the students are required to be present.

Divine Service is held on every Sunday morning, according to the forms of the Protestant Episcopal Church, in the Chapel of the University. Attendance at this service is required of every student, except in case of those connected with other religious bodies, to whom the President will grant permission at the beginning of each term (if requested by the parent or guardian, or by the student himself if he be 21 years of age) to attend during that term the place of worship of the body with which he is connected, where attendance on Sunday morning will be required.

SITE.

The situation of the Institution is healthful and beautiful. The region is famous for its railway and manufacturing enterprises; it possesses some of the richest iron and coal mines in our land, and thus gives the students rare facilities for confirming the teachings of the recitation room by the observation of the eye.

The University Buildings are about a half-mile from the depot, at the junction of the Lehigh Valley and North Pennsylvania Railroads. New York is ninety-two, and Philadelphia fifty-four miles distant.

BUILDINGS.

Packer Hall, named after the Founder, stands seven hundred feet back of Packer Avenue, at the base of the Lehigh Mountain. Built of handsome stone, it presents to the north a noble and imposing

front. At the western extremity is a belfry tower containing the President's room and the archive room. The eastern end is a large advanced wing in which are lecture and recitation rooms, and also a thoroughly equipped chemical laboratory. The central portion, eighty feet long, contains the Chapel, Drawing Room and Cabinets. To the east of Packer Hall stands the University Library, erected by the Founder in memory of Mrs. Lucy Packer Linderman, his daughter. To the west, within the grounds, are the houses of the President and Professors, comporting in architecture with Packer Hall. Fronting on Packer Avenue stand Christmas Hall and Saucon Hall, commodious brick edifices, containing students' rooms, heated by steam and lighted by gas, and a mess hall. Near Brodhead Avenue is the Sayre Observatory, the gift of Robert H. Sayre, Esq., of South Bethlehem, containing an equatorial and a zenith telescope, transit instrument and astronomical clock.

EXPENSES.

Tuition is FREE in all branches and classes. Books, materials, paper, pencils, chemical materials used in the analytical laboratory, and drawing instruments, are furnished by the student.

Rooms and board can be had in University buildings, under the following rules:

1. The room-rent, for each term, must be paid in advance to the Treasurer of the University. The price for board must also be paid monthly in advance.

2. The charge for board and room-rent shall be $5 per week. Where two students occupy a room jointly, the charge shall be $4.50 per week for each.

The charge for board shall be $4 per week. The charge for room without board shall be $2 per week for each room.

These prices include gas and heat.

3. The choice of rooms shall be in the order of the classes; in any class the first applicant to have the first choice.

4. Students may retain their rooms from year to year by giving notice of their intention so to do at the close of the academic year, and by procuring their tickets therefor on or before the first day of the next term.

5. Students are required to keep their rooms in order, or to employ some proper person to do so for them.

6. No furniture for rooms will be provided by the University.

7. The use of kerosene, coal oil or burning fluid, in any of the buildings, is prohibited.

The following is an estimate of the necessary expenses for the collegiate year, clothing and traveling not included.

Board for 40 weeks . . .	from $160 to $200
Room rent, with fuel and lights .	40 " 80
Care of room and use of furniture . .	5 " 20
Washing and incidentals . .	15 " 30
Books, stationery, etc. . . .	20 " 45
Total . . .	$240 to $375

NOTE.—If clubs be formed the cost of board need not exceed $3.50 per week.

ADMISSION OF STUDENTS.

Application for admission into the University should be made to the President, from whom all information may be obtained.

ADMISSION TO FRESHMAN CLASS.

Candidates for the Freshman class will be examined in 1882 on Friday and Saturday, June 16 and 17, and on Monday and Tuesday, September 4 and 5. The examinations are oral and rigorous. All candidates must be at least sixteen years of age, must present testimonials of good moral character, and satisfactorily pass in the following subjects:

1. *English Grammar*, including composition, spelling, and punctuation. It is recommended that candidates have a knowledge of Latin Grammar, although an examination in it is not required for any other course than the classical.
2. *Geography*, general and political.
3. *History of the United States.*
4. *Physical Geography*, Mitchell's or Guyot's, or an equivalent.
5. *Arithmetic*, including the metric system of weights and measures.

6. *Algebra*, through equations of the second degree.

7. *Chauvenet's Geometry*, or Davies' Legendre, six books, (Chauvenet preferred).

Candidates for the classical course are examined also in

8. *Latin.*—Latin Grammar (Harkness, or Allen and Greenough preferred); four books of Cæsar's Gallic war; six orations of Cicero including the four against Cataline; the Bucolics and first six books of Virgil's Æneid, including prosody; the translation at sight of passages from Cicero and Cæsar; the translation of English into Latin (as special importance is given this part of the examination, it is suggested to teachers that they connect exercises in making Latin both oral and written with all the studies of the preparatory course); Roman History (Creighton's Primer is suggested as indicating the amount required).

9. *Greek.*—Grammar (Goodwin's preferred); four books of Xenophon's Anabasis; three books of Homer's Iliad, including prosody; the translation at sight of a passage from some work of Xenophon; writing Greek with accents (the pronunciation of Greek according to the written accents is followed in the University and it is desirable that the students preparing to enter be taught this system); Greek History (Fyffe's Primer is suggested).

REGULAR STUDENTS.

All applicants for regular standing in the classes or schools must be prepared to pass an examination according to the programme of studies. A student may be admitted at any time if able to pass a satisfactory examination in the studies already pursued by the class that he purposes to enter. The only exception will be in the case of a young man who is very nearly but not thoroughly prepared to enter in full standing and who may, at the discretion of the Faculty, be admitted conditionally, to make up his deficiencies by extra study. When they are made up, he will be received in full standing into his class.

SPECIAL STUDENTS.

Young men who do not desire to take a full regular course may enter, upon a satisfactory examination, and select special shorter courses, with the sanction of the Faculty.

PROGRAMME OF STUDIES.

SHOWING THE NUMBER OF EXERCISES PER WEEK FOR EACH SUBJECT, AND THE TEXT-BOOKS USED.

The following is presented as the general programme of instruction, subject to such modifications from time to time as the Faculty may deem expedient, with the approval of the Trustees.

The names of the text-books studied are generally mentioned. The number of exercises per week in each subject is indicated by the figure in parenthesis immediately following.

Two hours of Drawing, three of work in the Laboratory, or three of practice in the field, are regarded as equivalent to a recitation or lecture of one hour's duration.

During the year Prof. Ringer, will deliver a course of lectures on the History of Europe, from the Congress of Vienna in 1815 to the Congress of Berlin in 1878.

THE SCHOOL OF GENERAL LITERATURE.

This school is intended to correspond to the course long established in our older colleges, modified by the needs and requirements of modern culture. Its object is to impart a comprehensive and liberal education to those who design to enter upon professional rather than technical pursuits.

It comprises two distinct courses: I. The Classical Course, or Course in Arts. II. The Course in Science and Letters.

THE CLASSICAL COURSE.

This course is chiefly designed for those who purpose to study Law and Theology; it includes full and rigorous instruction in the Ancient Classics, in Elementary Science and in General Literature. The study of Mathematics in this course embraces Algebra, Geometry, Trigonometry, Analytical Geometry, and the Calculus. The programme includes Physics, Chemistry and Elementary Mechanics. There are full courses in History, in the Science of Language and in the origin and growth of the English Language. There are also lectures on Psychology, the Christian Evidences, International and Constitutional Law and Political Economy. Lectures on Eng-

lish Literature are supplemented by critical readings of the standard English authors. The study of French or German is required. The graduate in this course obtains the degree of Bachelor of Arts.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Geometry (Chauvenet) completed. (4)

Physics.—Mechanics, with Lectures and Laboratory Practice. (2)

History.—Outlines of the World's History. (2)

English.—Rhetorical Praxis; Kellogg, with Essays and Declamations. (1)

Greek. — Homer: Odyssey. Prosody. Testament. History: Smith. (3)

Latin.—Livy. Prose Composition. History: Leighton. (4)

French.—Fasquelle's Introductory Course. Chouquet's Reader. (1) Or *German.*—Otto's Grammar. Writing in German Text. Translation. (1)

Physiology and Health.—Lectures.

SECOND TERM.

Mathematics.—Olney's University Algebra, Pt. III. Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (5)

Chemistry.—Lectures Fownes' Elementary Chemistry. (3)

History.—Outlines of the World's History. (2)

Greek.—Xenophon: Memorabilia of Socrates. Testament. History. (3)

Latin.—Cicero: Essays and Letters. Horace: Odes and Epodes. Composition, Prosody and History. (3)

French.—Languillier and Monsanto's Practical French Course. Keetel's Analytical Reader. Translation. (1) Or *German.*—Otto's Grammar. Translation. Ahn's Second German Reader. (1)

Essays and Declamations.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics. — Analytical Geometry: Olney's General Geometry. (4)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity, with Lectures and Laboratory Practice. (3)

Greek.—Felton's Greek Historians. History. (4)

Latin.—Tacitus: Agricola and Germania. Composition. History. (4)

French.—Languillier and Monsanto's Practical French Course. Oral Translation from French into English. Written Translation from English into French. Keetel's Analytical Reader. (2) Or *German.*—Otto's Grammar. Oral Translation from German into English. Written translation from English into German. Ahn's Reader. (2)

Essays and Declamations.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

English.—Coppée's Rhetoric, with Kellogg's Praxis. (2)

Greek.—Euripides: Medea. Greek Antiquities: Mahaffy. (4)

Latin.—Quintilian: Book X. Horace: Satires and Epistles. Composition. (4)

French.—Wall's Students' Grammar. Oral Translation from French into English. Written Translation from English into French. Chapsal's Littérature Française. Dictation. (2) Or *German.*—Systematic Reading of various authors. Translation. Dictation. (2)

Essays and Declamations.

JUNIOR CLASS.

FIRST TERM.

History.—Ancient History: Thalheimer. (3)

Philosophy.—Psychology. Porter's Elements of Intellectual Science. (2)

English.—Coppée's English Literature. (2)

French.—Wall's Students' Grammar. Translations. Chapsals Littérature Française. Dictation. (3) Or *German.*—Lectures on Syntax. Systematic Readings of various authors. Compositions in German. (2)

Greek.—Sophocles: Electra. Antiquities. (4)

Latin.—Plautus and Terence. Roman Antiquities: Wilkins. (2)

Essays and Original Orations.

SECOND TERM.

History.—History of England: Hume. (3)

Philosophy.—Political Economy. (1) Coppée's Logic. (2)

English.—English Philology. Schele De Vere. (2)

French.—Wall's Students' Grammar. Systematic Reading of various authors. Compositions in French. Dictation. (2) Or *German.*—Systematic Reading of various authors. Translation. Dictation. (2)

Greek.—Aristophanes: Clouds. History of Greek Literature. (4)

Latin.—Juvenal and Persius. Pliny: Select Epistles. Cruttwell's History of Roman Literature. (3)

Essays and Original Orations.

SENIOR CLASS.

FIRST TERM.

International Law.—Lectures: Woolsey and Halleck. (2)

History.—Decline and Fall of the Roman Empire: Gibbon. (3)

Philosophy.—History of Philosophy: Ueberweg. (2)

Astronomy.—Loomis' Treatise, with Lectures. (3)

French.—Systematic Readings of various authors. Conversation. Lectures on French Literature. Demogeot's Littérature Française. Compositions. (2) Or *German.*—Systematic Readings. Compositions. Conversation. Scherr's Geschichte der deutchen Literatur. (2)

Latin.—Lucretius, with Lectures. Roman Literature. (3)

Greek.—Theocritus. Greek Literature. (2)

Essays and Original Orations.

SECOND TERM.

Constitutional Law.—Lectures. (1)

History.—History of France. (2)

Philosophy.—Moral Philosophy (Hopkins) and Christian Evidences. (2) Philosophy of History. Lectures. (2)

French.—Systematic Readings. Compositions. Conversation. Lectures in French on French Literature. Demogeot's Littérature Française. (2) Or *German.*—Systematic Readings. Compositions. Conversations. Lectures in German on German Literature. Scherr's Geschichte der deutschen Literatur. (2)

Geology.—Lectures. Dana. (2)

Latin.—Catullus, Tibullus and Propertius. Cicero: de Officiis, with Lectures. Roman Literature (completed). (3)

Greek.—Demosthenes: Public Orations. Greek Literature (completed). (2).

Lectures on English and American Literature. (2)

Preparation of Theses.

THE COURSE IN SCIENCE AND LETTERS.

The Course in Science and Letters, leading to the Degree of Bachelor of Science (B.S.) is designed for those who wish to pursue both Scientific and Literary studies without Latin and Greek. These being omitted, extended instruction is given in both French and German, History, General Literature, Mathematics and General Science.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Geometry (Chauvenet) completed. (4)

Physics.—Mechanics, with Lectures and Laboratory Practice. (2)

History.—Outlines of the World's History. (2)

English.—Rhetorical Praxis: Kellogg, with Essays and Declamations. (1)

French.—Languillier and Monsanto's Practical French Course. Keetel's Analytical Reader. Translation. (3)

German.—Otto's Grammar. Writing in German Text. Translation into English. (3)

Physiology.—Huxley and Youmans. (2)

Drawing.—Elementary projections, shading and lettering. (2)

Physiology and Health.—Lectures.

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. Plane and Spherical Trigonometry and Mensuration. Use of the Logarithmic Tables. (5)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

History.—Outlines of the World's History. (2)

French.—Languillier and Monsanto's Practical French Course. Keetel's Analytical Reader. (3)

German.—Otto's Grammar. Translations. Ahn's Second German Reader. (3)

Botany.—Lectures and Laboratory Work. Gray. (1)

Drawing.—Projection Drawing; Elements of Descriptive Geometry. (2)

Essays and Declamation.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney'sGeneralGeometry. (4)

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (5)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity, with Lectures and Laboratory Practice. (3)

German.—Otto's Grammar. Oral Translations from German into English. Written Translations from English into German. Ahn's Reader. (2)

French.—Languillier and Monsanto's Practical French Course. Keetel's Analytical Reader. Oral Translation from French into English. Written Translation from English into French. (2)

Zoology.—Lectures and Laboratory Work (vertebrates): Huxley. (1)

Essays and Declamations.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Optics, and Acoustics, with Lectures and Laboratory Practice. (5)

English.—Coppée's Rhetoric, with Kellogg's Praxis. (2)

German.—Systematic Readings of various authors. Translation. Dictation. (2)

French.—Wall's Students' Grammar. Oral Translation from French into English. Written Translation from English into French. Chapsal's Littérature Française. Dictation. (2)

Zoology.—Lectures and Laboratory Work (vertebrates and invertebrates). Huxley. (3)

Essays and Declamations.

JUNIOR CLASS.

FIRST TERM.

History.—Ancient History: Thalheimer. (3)

Philosophy.—Psychology. Porter's Elements of Intellectual Science. (2)

English.—Coppée's English Literature. (3)

French.—Wall's Students' Grammar. Translation. Dictation. Chapsal's Littérature Française. (2)

German.—Systematic Reading of various authors. Compositions in German. Lectures on the Syntax. (2)

Crystallography.—Lectures with Practical Exercises in the determination of Crystals. (2)

Mathematics.—Integral Calculus: Courtenay. (2)

Essays and Original Orations.

SECOND TERM.

History.—History of England: Hume. (3)

Philosophy.—Political Economy. (1) Coppée's Logic. (2)

English.—English Philology. Schele De Vere. (2)

French.—Wall's Students' Grammar. Systematic Readings. Compositions. Chapsal's Littérature Française. Dictation. (2)

German.—Systematic Readings of various authors. Compositions in German. (2)

Mineralogy.—Descriptive Mineralogy, with practical exercises in the determination of Minerals. (3)

Biology.—Nicholson. (1)

Essays and Original Orations

SENIOR CLASS.

FIRST TERM.

International Law.—Lectures: Woolsey and Halleck. (2)

History.—Decline and Fall of the Roman Empire. (3)

Philosophy.—History of Philosophy: Ueberweg. (2)

Astronomy.—Loomis' Treatise, with Lectures. (3)

French.—Conversation. Systematic Reading of various French authors. Dictation. Composition. Lectures on French Literature. Demogeot's Littérature Française. (2)

Geology.—Lithology and Laboratory Practice. Formation of Strata. General Definitions of Geology. (3)

German.—Systematic Readings of various authors. Conversation. Composition. Lectures on German Literature. Scherr's Geschichte der deutschen Literatur. (2)

Essays and Original Orations.

SECOND TERM.

Constitutional Law.—Lectures. (1)

History.—History of France. (2)

Philosophy.—Moral Philosophy (Hopkins) and Christian Evidences. (2) Philosophy of History. Lectures. (2)

French. — Systematic Readings. Composition. Conversation. Lectures in French on French Literature. Demogeot's Littérature Française. 2.

Geology.—Historic, Dynamic and Economic Geology. (4)

Special Work in Philosophy.— The Modern Systems: Ueberweg. (1)

Lectures on English and American Literature. (2)

German.—Lectures in German on German Literature. Systematic Readings. Compositions. Conversation. Scherr's Geschichte der deutschen Literatur. (2)

Preparation of Thesis.

THE SCHOOL OF TECHNOLOGY.

This school includes four distinct courses: I. The Course in Civil Engineering; II. The Course in Mechanical Engineering; III. The Course in Mining and Metallurgy; IV. The Course in Chemistry. These have the same curriculum of studies for the first three terms (one year and a half). At the end of that time the student selects his course and follows its programme.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Chauvenet's Geometry, (completed). (5)

Physics.—Mechanics, with Lectures. (2)

German.—Otto's Grammar. Writing in German Text. Translations into English. (3) Or *French.*—Fasquelle's Introductory Course. Chouquet's Reader. (3)

Drawing.—Elementary Projections, Shading and Lettering. Free-hand Drawing. (4)

Physiology and Health.—Lectures. (1)

English.—Essays and Declamations. (2)

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. (3) Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (2)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

German.—Otto's German Grammar. Translations. Ahn's Second German Reader. (3) Or *French.*—Languillier and Monsanto's Practical French Course. Translations. Keetel's Analytical Reader. (3)

Botany.—Lectures and Practice. Gray. (1)

Drawing.—Projection Drawing. Descriptive Geometry. (2)

English.—Essays and Declamations. (2)

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

Chemistry.—Lectures and Laboratory Practice: Galloway's Qualitative Analysis. (5)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity. with Lectures. Laboratory Practice in these branches and Mechanics. Barometrical leveling and Measurement of heights. (3)

German.—Otto's Grammar. Oral translations. Ahn's Reader. (2) Or *French.*—Languillier and Monsanto's Practical French Course. Translations. Keetel's Analytical Reader. (2)

Drawing.—Isometric Drawing. Architectural Drawing. (2)

English.—Essays and Declamations. (1)

THE COURSE IN CIVIL ENGINEERING.

The general scope of this Course comprises the higher branches of the applied mechanics and mathematics, together with the principles of construction and exercises in mapping, drawing and designing. The student is made acquainted with the strength of materials, including the theory of elasticity or flexure, the principles of construction of roof-trusses, beams, girders and bridges, the determination of their proper dimensions and the preparation of working drawings. Under this head belong also the theory of the stability of structures, including the theory of the arch and of retaining walls; the principles of hydrostatics and hydraulics with their applications to vertical water wheels and turbines. The theoretical principles are in all cases illustrated by examples from actual engineering practice. Much time is devoted to surveying operations and to actual practice in the field. Profiles, plans of topographical surveys, contour maps, and railroad charts, are made. The practical operations connected with the reconnaissance, location and survey of roads, canals and railroads, are fully illustrated in the field. Thorough instruction is given in drawing, the construction of working drawings of structures, topography and hydrographical charts.

Attention is also paid to the application of the general principles of the science of engineering, or to engineering construction, including the composition and qualities of materials; their dressing and preservation; foundations, earth and rock-work; the drainage, collection and distribution of water. Visits of inspection to engineering structures in the Lehigh Valley and vicinity are regularly made. So much of Mechanical Engineering is necessarily included, as refers to the construction of bridges, and the special machinery and appliances used in the erection of structures. There is also thorough instruction in mineralogy and geology. The course in astronomy in the Senior year includes practical work in the observatory.

Designs for and reviews of special structures, specifications and estimates of quantities and cost, and the preparation of a graduation Thesis giving evidence of satisfactory attainments, complete the course of study.

The graduate in this course will receive the degree of Civil Engineer. (C. E.)

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Acoustics, Light, with Lectures and Laboratory Practice. (5)

German.—Systematic Readings. Translation. Dictation. (2) Or *French.*—Wall's Students' Grammar. Systematic Readings. Dictation. (2)

Drawing.—Line Shading. Sketching. Drawing of Structures from actual measurement. (2)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles and Contour Maps. (3)

English.—Essays on scientific subjects. Declamations (1)

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus: Courtenay. (2)

German.—Systematic Readings. Lectures on Syntax. Compositions in German. (2) Or *French.*—Readings. Translation. Dictation. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in General. Statics. Dynamics and Statics of Fluids. Lectures on the Theory of Centre of Gravity and Moment of Inertia. (5)

Surveying.—Triangulation. Leveling. Topographical Surveys and Maps. (4)

Construction.—Materials of Construction. Carpentry. Masonry. Foundations. (1)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

English.—Essays on engineering subjects. Declamations. (1)

SECOND TERM.

German.—Systematic Readings. Compositions. (2) Or *French.*—Systematic Readings. Compositions. (2)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of columns, shafts, and beams. Testing of materials. (3)

Surveying.—Railroad Reconnoissance and Location. Survey of a Line, with profile, map and estimate of cost. (3)

Stone-Cutting.—Working drawings of piers and arches. (2)

Construction.—Methods of construction and maintenance of roads and railroads. (1)

Prime Movers.—Steam Engines and their accessories. (3)

Mineralogy.—Descriptive Mineralogy, with practical exercises in the determination of minerals. (3)

Essays and Original Orations.

SENIOR CLASS.

FIRST TERM.

Astronomy.—Descriptive Astronomy: (3)

Roofs and Bridges.—Theory and calculation of strains in trusses. (3)

Graphical Statics.—Analysis of roof trusses and arches. (2)

Surveying.—Use of plane table and sextant. Hydrographic surveys and charts. Gauging of streams. Geodetic surveying. (3)

Construction and Design.—Study of bridge details. Reports on stability of bridges. Design for a simple structure. (3)

Geology.—Lithology, with practical exercises in determining rocks. (3)

SECOND TERM.

Astronomy.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescope. (2)

Surveying.—Mine Surveying, with practical work. (1)

Hydraulics.—Flow of water in pipes and rivers. Water supply engineering. Hydraulic motors. (3)

Construction and Design.—Specifications and Contracts, with Designs and Estimates for Engineering Projects. Patent office Rules and Regulations. (2)

Practical Dynamics.—Machinery for transporting, handling, and lifting materials. (2)

Geology.—Historic, dynamic and economic. Dana. (3)

English Literature.—Lectures. (2)

Christian Evidences.—Lectures. (1)

Preparation of Theses.

THE COURSE IN MECHANICAL ENGINEERING.

The object of this course is the study of the Science of Machines; the principal subjects taught are: the nature, equivalence and analysis of mechanisms, the mechanics or theory of the principal classes or types of machinery, Mechanical Technology and the principles and practice of Machine Design.

That the students may obtain the practical engineering data which they will most need when beginning their work as mechanical engineers, they are required to pursue a course of Shop Instruction which does not necessarily involve manual labor and manipulation of tools but is principally devoted to familiarizing them with those points in pattern-making, moulding, forging, fitting and finishing, which they need to know as designers of machinery. Particular attention is therefore directed to the forms and sizes of machine parts that can be readily constructed in the various workshops, to the time that it takes to perform and the order of the various operations, to the dimensions most needed by workmen (in order that the students may learn to dimension working drawings judiciously) and to the various devices—ordinarily escaping the beginner's notice—for increasing the accuracy of the work, durability of the parts, conveniences of manipulation and safety of the workmen. This involves acquaintance with the processes and machinery of the workshops, but it is the foreman's and superintendent's knowledge which is required rather than the manual dexterity and skill of the workman and tool-hand. The acquirements peculiar to the latter are by no means despised, and students are encouraged to familiarize themselves therewith during leisure hours, but manual work in the shops forms no regular part of the course. On the contrary, the student enters the shop with hands and mind free to examine all the processes, operations and machinery, and ready at any moment at the call of the teacher, to witness an operation of special interest or to examine into the causes of and remedies for any sudden break down. Dressed in overalls and provided with note-book, pencil, calipers and measuring rule, the student sketches the important parts of the various machine-tools, notes down the successive steps of each of the important shop-processes as illustrated by the pieces operated upon, and, having first obtained a clear idea from the working draw-

ings of what is about to be constructed, follows pieces of work through the shops from the pig or merchant form to the finished machine.

That the students may learn to observe carefully and be trained to think and observe for themselves in these matters, there is required of them a full description of the various processes, operations and tools involved in the production of each one of a series of properly graded examples of patterns, castings, forgings and finished pieces which are not being constructed in the shops at the time and the drawings or blue prints for which have been given to them on entering the shops. The student's work is directed not only by these drawings and by the printed programme given him at the start, but also personally by a teacher, who accompanies him into the shops, gives necessary explanations, and who tests the extent and accuracy of his knowledge by examining the sketches and notes, and by frequent questioning. Finally the results of these observations and the sketches made are to be neatly embodied in a memoir.

During the course there are frequent visits of inspection to engineering works, both in and out of town, with special reference to such subjects as Prime Movers, Machinery for lifting, handling and transporting, and Machinery for changing the form and size of materials. It is intended that each of these excursions shall have some definite purpose in view which must be fully reported by the students.

The instruction in Machine Design, during the second term of Junior year, consists in determining rational and empirical formulas for proportioning such machine parts as come under the head of fastenings, bearings, rotating, sliding and twisting pieces, belt and toothed gearing, levers and connecting rods, also, in comparing recent and approved forms of these same parts with respect to their advantages as regards fitness, ease of construction and durability, and in making full sized working drawings of these parts; all the dimensions are determined by the students from the above mentioned formulas, the data being given as nearly as possible as they would arise in practice. During the first term of the Senior year, the students undertake the calculations, estimates and working drawings involved in the design of a simple but complete machine, each student being engaged upon a different machine. From the finished drawings of each machine, tracings are to be made and then "blue prints" taken for distribution among the other members

of the class. During the latter part of the term the whole class take up the design of a steam engine, every dimension being determined by the students, and complete working drawings made. In the case of the simple machines and of the steam engine, the general plan or arrangement will be given to the students in the form of either rough sketches, photographs or wood-cuts. This work will continue to the middle of the last term of the Senior year. From this time on the students are expected to make original designs for simple mechanisms, whose object has been fully explained. Throughout the course the work in the draughting room is carried on as nearly as possible like that of an engineering establishment, and special attention is paid to methods of expediting the work of calculation by means of simple formulas, tables and diagrams.

The graduate in this course will receive the degree of Mechanical Engineer (M. E.)

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanisn, Acoustics, Light, with Lectures and Laboratory Practice. (5)

German.—Systematic Readings. Translation. Dictation. (2) Or *French* —Systematic Readings. Dictation. (2)

Drawing.—Line Shading. Sketching. Drawing of Machines from actual measurement. (2)

Kinematics.—Nature and equivalence of mechanisms. (3)

English.—Essays on scientific subjects. Declamations. (1)

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calulus: Courtenay. (2)

German.—Systematic Readings. Compositions. (2) Or *French.*—Systematic Readings. Compositions. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Mechanical Technology.—Shop instruction. Examination of the processes and appliances involved in pattern making, moulding, forging, fitting and finishing, with sketches and reports. (7)

Essays and Declamations. (1)

SECOND TERM.

German.—Systematic Readings. Compositions in German. (2)
Or *French.*—Systematic Readings. Compositions. (2)

Strength of Materials.—Elasticity and strength of wood, stone and metals. Theory of beams, shafts and columns. Experimental tests. (3)

Prime Movers.—Steam Engines and their accessories. (3)

Machine Design.—Proportioning of such machine parts as come under the head of Fastenings, Bearings, Rotating and Sliding Pieces, Belt and Toothed Gearing, Levers and Connecting Rods. (5)

Metallurgy. — Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (4)

Essays and Original Orations.

SENIOR CLASS.

FIRST TERM.

Thermodynamics.—General principles; application to Steam Engines and Air Compressors. (3)

Graphical Statics. — Graphical analysis of roof trusses and girders. (2)

Machine Design.—Calculations and working drawings for the following machines: Drills, Hoists, Pumps, and Shearing, Punching and Milling Machines. Design for a Steam Engine begun. (5)

Kinematics.—Diagrams of the changes of position, speed and acceleration in mechanisms. Link and valve motions. Quick return motions. (3)

Practical Dynamics.—Machinery for lifting, handling and transporting materials. (2)

Mechanical Engineering Instruments.—Appliances and apparatus for gauging, recording and testing employed in shops and in experimental work. (2)

SECOND TERM.

Practical Dynamics.—Machinery for lifting, handling and transporting materials. (2)

Machine Design.—Design for a Steam Engine completed. Original Designs. (5)

Hydraulics.—Flow of water in pipes and channels; hydraulic motors. (2)

Measurement of Power.—Indicating of Steam Engines; determination of evaporative efficiency of boilers; dynamometer experiments.(1)

Mill Work.—Setting of machinery and Transmission of power. (1)

Specifications.—Contracts. Requirements of Patent Office. (1)

English Literature.—Lectures. (2)

Christian Evidences.—Lectures. (1)

Preparation of Theses.

THE COURSE IN MINING AND METALLURGY.

In addition to the physics, chemistry, literature, higher mathematics and mechanics necessary to all technical education, the scheme of studies comprises courses in mining, metallurgy, geology, mineralogy, dynamics, qualitative and quantitative analysis, blowpipe analysis, topographical and mine surveying and drawing. On account of the great number and scope of the studies necessary to the completion of this course, it is five years in length.

The graduate in this course will receive the degree of Engineer of Mines. (E. M.)

At the completion of the fourth year of this course, the student will receive the degree of Bachelor of Metallurgy. (B.M.)

In the courses of mineralogy, geology and analytical chemistry, much attention is paid to the practical instruction of the student in determining minerals by their crystallographical and physical properties, and, by the aid of blowpipe analysis, in the determination of rocks; in the qualitative and quantitative examination of ores and metallurgical products and in the rapid methods of assaying ores by the dry and wet ways employed in metallurgical laboratories. The location of the University in the vicinity of the iron works of the Lehigh Valley and especially of the extensive establishment of the Bethlehem Iron Company, affords unusual facilities for the practical study of iron metallurgy. The processes for the manufacture of spelter and oxide of zinc may be studied at the Bethlehem Zinc Works. The facilities for the practical study of mining and economic geology are not excelled by those of any other Institution in the country. The zinc mines at Friedensville and the brown hematite and slate deposits of the Lehigh Valley are in the immediate vicinity, while

within easy reach by rail are the anthracite coal fields of Pennsylvania, the iron and zinc mines of New Jersey, and the celebrated iron mines at Cornwall, Pa.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Acoustics, Optics, with Lectures and Laboratory Practice. (5)

German.—Systematic Readings. Translation. Dictation. (2)
Or *French.*—Systematic Readings. Translation. Dictation. (2)

Assaying.—Including the Assay by the dry methods of Gold, Silver, Copper, Lead, Iron and Tin ores. Laboratory Work. Ricketts. (1)

Chemistry.—Quantitative Analyses: Laboratory Work: Fresenius. (5) The following analyses are executed by the students:

1. Iron Wire (Fe)
2. Bronze (Cu, Sn, Zn)
3. Silver Coin (Au, Ag, Pb, Cu)
4. Zinc Ore (Zn) By both Gravimetric and Volumetric Methods.
5. Copper Ore (Cu)
6. Spiegeleisen (Mn)
7. Lead Ore (PbS)
8. Ilmenite (TiO_2)

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus: Courtenay. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Barometrical Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Chemical Philosophy.—Cooke. (5)

Kinematics.—Diagrams of the changes of position, speed and acceleration in Mechanics. Link and Valve motions. Quick Return motions. (3)

German.—Systematic Readings. Compositions in German. (2)
Or *French.*—Reading. Translation. Dictation. (2)

SECOND TERM.

Metallurgy. — Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (4)

Blow-pipe Analysis.—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

Prime Movers.—Steam Engines and their accessories. (3)

Strength of Materials.—Elasticity and strength of wood, stone and metals. Theory of beams, columns and shafts. (3)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles and Contour Maps. (3)

German.—Systematic Readings. Compositions in German. (2)
Or *French.*—Systematic Readings. Compositions. (2)

Drawing.—Elements of Machine Design. Plans and Elevations of Furnaces. (2)

SENIOR CLASS.

FIRST TERM.

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (5)

Crystallography.—Lectures with Practical Exercises in the determination of Crystals. (2)

Thermodynamics. — General Principles: Applications to Steam Engines and Air Compressors. (3)

Practical Dynamics.—Machinery for lifting, handling and transporting matter. (2)

Roofs and Bridges.—Theory and calculation of strains in framed trusses. (3)

Chemistry.—Fresenius' Quantitative Analysis. (2) The following analyses are executed by the students:

9. Iron Ore (Complete Analysis)
10. Limestone (Complete Analysis)
11. Coal (Volatile Matter,—Fixed Carbon, Ash, H_2O, S, P)

SECOND TERM.

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals: E. S. Dana. (3)

Blow-pipe Analysis.—Practice. (1)

Hydraulics.—Flow of water in pipes and channels; hydraulic motors. (2)

Practical Dynamics.—Machinery for lifting, handling and transporting matter. (2)

Measurement of Power. — Indicator Cards. Determination of Evaporative Efficiency of Boilers. Dynamometers Experiments. (1)

Mill Work.—Setting of Machinery and Transmission of Power. (1)

English Literature.—Lectures. (2)

Christian Evidences.—Lectures. (1)

Chemistry.—Fresenius' Quantitative Analysis. (3) The following analyses are executed by the students:

12. Slag. (Complete Analysis).
13. Manganese Ore (MnO_2)
14. Pig Iron (Complete Analysis)
15. Nickel Ore (Ni, Co)
16. Gas Analysis (Complete Analysis of Illuminating Gas)

Projects.—On Metallurgical Subjects. (1)

FIFTH YEAR.

FIRST TERM.

Astronomy.—Descriptive Astronomy; Loomis. (3)

Mining.—Modes of Occurrence of the Useful Minerals. Searching for Mineral Deposits. Examination of Mining Properties. Boring. Mining Tools, Machines and Processes. Timbering and Masonry. Callon. André. (4)

Geology.—Lithology, with practical exercises in determining Rocks. Cotta. Rutley. General Geological Definitions and Principles. Dana. (4)

Zoology.—Lectures. (2)

Surveying.—Triangulation. Leveling. Topographical Surveys and Maps. (4)

SECOND TERM. [TO EASTER]

Mining.—Methods of Working. Underground Transportation. Hoisting, Drainage and Pumping. Ventilation and Lighting. Mechanical Preparation of Ores. Coal Washing. (3)

Geology.—Historic, Dynamic and Economic. (4)

Mine Surveying.—Practice in the Mines. Map drawing. (2)

Astronomy.—Practical work. (2)

Drawing.—Mining Plant. Systems of Timbering. Geological Maps and Sections. (4)

Projects.—In Mining, Geology and Metallurgy. (2)

THIRD TERM. [AFTER EASTER.]

Astronomy.—Practical work. (2)

Notes on mining costs.

Excursions.

Theses.

THE COURSE IN CHEMISTRY.

This course of instruction continues the subject of Theoretical Chemistry from the general course of the two previous terms, the subject of Chemical Philosophy and Organic Chemistry being taught by daily recitations in the Junior and Senior years.

In Analytical Chemistry, the course of Qualitative Analysis in the first term of the second year is followed by preparation of Chemical Compounds and purification of Chemicals.

Subsequently, Quantitative Analysis is pursued to the end of the course, including the Dry Assaying of Ores of gold, silver, copper, lead, iron and tin, and the Wet Analyses, included in the appended schedule. In addition, courses of Lectures on Medical, Agricultural and Technical Chemistry are given, and various industrial establiishments in the neighborhood and in Philadelphia and New York are visited, in the company of an instructor. The course also includes thorough instruction in Physics and Mechanics, Mineralogy and Blow-pipe Analysis, Metallurgy, Geology and Descriptive Astronomy.

The last term of the Senior year is mainly devoted to the preparation of a Thesis on some sebject, selected by the professor, involving practical work in the Laboratory, in addition to the literary labor, and each graduate will thus make a contribution to the progress of the science as a preliminary to the reception of his degree.

The course is thus seen to include thorough instruction in theoretical and applied chemistry, in their various branches, as well as, in those cognate sciences of such great value to the chemist.

The Laboratories are under the immediate charge of the Professor and his Assistant, and, together with the Lecture-room, are unsurpassed in excellence by any similar establishment in the country, being supplied with all the modern improvements. The collections of apparatus, specimens and models, illustrating theoretical and applied chemistry, are already important and rapidly increasing.

Students are charged for the chemicals and apparatus consumed. If the student is moderately careful, this expense need not exceed $60 per year.

The graduate of this course will receive the degree of Analytical Chemist. (A.C.)

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Acoustics, Light: with Lectures and Laboratory Practice. (5)

German.—Systematic Readings. Translations. Dictation. (2)

Or *French.*—Systematic Readings. Translations. Dictation. (2)

Chemical Preparations.—Including the Preparation of Chemical Compounds and the Purification of Chemicals by Distillation, Sublimation, Fusion, Crystallization, Precipitation, etc. (2)

Assaying.—Including the Assay by the dry methods of gold, silver, copper, lead, iron and tin ores. Ricketts. (1)

Blow-pipe Analysis.—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

Essays and Declamations. (1)

JUNIOR CLASS.

FIRST TERM.

Chemical Philosophy.—Cooke. (5)

Toxicology.—Otto on Poisons. (1)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (6)

The following analyses are executed by the students:

1. Iron Wire (Fe)
2. Potassic Dichromate (Cr_2O_3)
3. Baric Chloride (Ba, Cl, H_2O)
4. Magnesic Sulphate (MgO, SO_3, H_2O)
5. Hydro Di-Sodic Phosphate (P_2O_5)
6. Bronze (Cu, Sn, Zn)
7. Rochelle Salt (K_2O, Na_2O)
8. Volumetric Determination of Chlorine.
9. Acidimetry (HCl, H_2SO_4, HNO_3)
10. Alkalimetry (KOH, NaOH, NH_4OH).
11. Chlorimetry (Bleaching Powders)
12. Silver Coin (Au, Ag, Pb, Cu)
13. Zinc Ore (Zn)

Crystallography.—Lectures, with Practical Exercises in the Determination of Crystals. (2)

German.—Systematic Readings. Compositions in German. (2)
Or *French.*—Systematic Readings. Compositions. (2)

Anatomy and Physiology.—Lectures. (1)

SECOND TERM.

Organic Chemistry.—Wöhler. (3)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (7)
The following analyses are executed by the student:

14. Copper Ore (Cu)
15. Spiegeleisen (Mn)
16. Lead Ore (PbS)
17. Ilmenite (TiO_2)
18. Iron Ore (Complete Analysis)
20. Coal (Volatile Matter,—Fixed Carbon, Ash, H_2 O, S, P)
21. Slag. (Complete Analysis)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (4)

German.—Systematic Readings. Compositions in German. (2)
Or *French.*—Systematic Readings. Compositions. (2)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

SENIOR CLASS.

FIRST TERM.

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (5)

Quantitative Analysis. — Fresenius' Quantitative Analysis. (8) The following analyses are executed by the student:

22. Guano (NH_2, P_2O_5, H_2O)
23. Clay (Complete Analysis)
24. Manganese Ore (MnO_2)
25. Mineral Water (Complete Analysis)
26. Pig Iron (Complete Analysis)
27. Nickel Ore (Ni, Co)
28. Organic Analysis (C, H, O, N)
29. Gas Analysis (Complete Analysis of Illuminating Gas.)

Astronomy.—Descriptive Astronomy: Loomis. (3)

SECOND TERM.

Chemistry Applied to the Arts.—Lectures. (3)

Medical Chemistry.—Lectures. (1)

Agricultural Chemistry.—Lectures. (1)

Geology.—Historic, Dynamic and Economic Geology. Lectures. Dana. (4)

Christian Evidences.—Lectures. (1)

English Literature and History.—Lectures. (2)

Preparation of Theses.

GRADUATING THESES.

Every student will be required to present a thesis upon some topic connected with his special course, as a necessary portion of the exercises for his final examination for a diploma. These theses shall be accompanied by drawings and diagrams, when the subjects need such illustration. The originals will be kept by the University, as a part of the student's record, for future reference; but a copy may be retained by the student, and be published, permission being first obtained from the President.

DIPLOMAS AND CERTIFICATES.

The Diploma is given only to those who have passed all the examinations in a regular course and is signed by the President and

Secretary of the Board of Trustees and by the Faculty of the University. For all partial courses a certificate is given showing what the student has accomplished, and is signed by the President and Secretary of the Faculty.

GRADUATE STUDENTS.

Graduates of the University wishing to remain a year or more and pursue a course of studies as candidates for another degree may do so with the sanction of the Faculty. Graduates wishing to take special courses of study will be afforded every facility in so doing.

POST GRADUATE DEGREES.

M. A.

The Faculty will recommend for the Degree of Master of Arts, candidates otherwise properly qualified, who after taking at this University the Degree of Bachelor of Arts, shall pursue for at least two years, at the University, a course of liberal study approved by the Faculty, pass a thorough examination on the same, and presents satisfactory theses.

Ph. D.

The Faculty will recommend for the Degree of Doctor of Philosophy, candidates otherwise properly qualified, who, after taking at this University either of the Degrees of Civil, Mechanical or Mining Engineer, or Analytical Chemist, shall pursue, for two years, at the University, a course of advanced Scientific study in the line of their profession, pass a thorough examination in the same, and present satisfactory theses.

D. Sc.

The faculty will recommend for the Degree of Doctor of Science, candidates otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Science, shall pursue for at least two years, at the University, a course of Scientific study, embracing two subjects approved by the Faculty, pass a thorough examination, showing in one of the subjects special attainments, and shall present satisfactory theses in one of the subjects, based upon original scientific investigation.

Candidates for any of the above postgraduate degrees, who are not graduates of this University, must give satisfactory evidence of having fulfilled the requirements for graduation in the corresponding undergraduate course. The acceptance of a certificate as evidence of proficiency, in lieu of examination, is at the discretion of each professor as to the subjects in his department.

The requirement of residence may be omitted in special cases by the Faculty.

THE UNIVERSITY LIBRARY.

The Library Building was erected by the Founder of the University in 1877, at a cost of One Hundred Thousand Dollars, as a memorial of his daughter, Mrs. Lucy Packer Linderman, and during the same year more than Twenty Thousand Dollars were contributed by the family and friends of that estimable woman, as a memorial fund for the purchase of books. By the will of the Founder of the University a fund of $500,000 has been given for the permanent endowment of the Library.

The building is semi-circular in plan, with a handsome façade in the Venetian style of architecture. It is constructed of Potsdam sandstone with granite ornamentation. In the interior, the centre is occupied as a reading space, fifty by forty feet, from which radiate the book cases, extending from floor to ceiling; two galleries affording access to to the upper cases. Shelf room is now provided for Eighty Thousand Volumes. The building is thoroughly fireproof, well lighted, and heated by steam.

Twenty-five thousand volumes are now upon the shelves, including many extremely valuable works. The list of periodicals numbers about fifty, embracing as far as possible all departments of knowledge.

The Library is conducted strictly for consultation, and is open to the use of the public; both of which conditions are in accord with the terms of the gift.

REGULATIONS OF THE LEHIGH UNIVERSITY LIBRARY.

I. The Library is open every day, except Sundays and Legal Holidays, from 8 A. M. until 10 P. M.

II. Admission is free to all persons over 16 years age.

III. Readers are required to write their names and addresses in the Daily Register of the Library. They also write the name of the book desired upon a Library Card, with their signatures, and present the same to the Director's Clerk, who supplies the book, retaining the card as a receipt. Before leaving the Library, readers return their books to the clerk, and receive their cards.

IV. No book is permitted, under any circumstances, to be taken from the Library

V. No person is allowed to enter the alcoves, or remove any book from the shelves, without the permission of the Director.

VI. Readers wishing to consult the more valuable illustrated works make special application for that purpose.

VII. In taking notes, pencils, and not pens and ink, are to be used.

VIII. Audible conversation and the use of tobacco are strictly forbidden in any part of the Library.

IX. Any person not conforming to these Regulations, will be denied the privilege of the Library.

X. Any person, who defaces, in any way, any book, magazine or paper, or the furniture, or any portion of the building, in addition to being deprived of the privileges of the Library, will be prosecuted according to law.

OBSERVATORY.

By the liberality of Robert H. Sayre, Esq., one of the Trustees of the University, an Astronomical Observatory has been erected on the University grounds, and placed under the charge of the Professor of Mathematics and Astronomy.

In the dome of the observatory is mounted at Equatorial Telescope, of six inches aperture, by Alvin Clark & Sons. The west wing contains a superior Sidereal Clock, by Wm. Bond & Sons; a Zenith Telescope, by Blunt, and a Field Transit, by Stackpole. There is also a Prismatic Sextant, by Pistor & Martins.

Students in practical Astronomy receive instruction in the use of the instruments and in actual observation.

The grounds upon which the observatory stands, consisting of seven acres of land adjoining the original grant, was presented to the University by Charles Brodhead, Esq., of Bethlehem.

An advanced course in Astronomy and the higher Analysis has been established, requiring two years for its completion. It is adapted to the attainments of the graduates of this University, but is open to any one who may be prepared to pursue it.

This course embraces the following subjects:

First Year — Spherical Astronomy. Theory of Instruments. Method of Least Squares. Numerical Calculus.

Second Year—Celestial Mechanics. Interpolation and Quadrature. Computation of Orbits and Perturbations.

During the entire course, the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

STUDENTS' SOCIETIES.

THE CHEMICAL AND NATURAL HISTORY SOCIETY.

This Society was organized in the Fall of 1871, as "The Chemical Society," but was afterwards expanded, as its present title indicates, and admits, by election, students from all departments of the University.

The collections of Chemical Preparations, and Botanical and Zoölogical Specimens belonging to the Society, are already important. During the past years persons have been sent to Texas and Brazil to collect specimens for these cabinets.

The Society has organized and maintained several courses of public scientific lectures. Among the honorary members of the Society are more then one hundred of the most distinguished scientists in Europe and the United States.

THE ENGINEERING SOCIETY.

This Society was organized in 1873 and admits by election students in the Junior and Senior Classes. Its meetings are held monthly.

THE LITERARY SOCIETY.

This Society was organized in 1880 and is composed of students from all departments. It meetings are held semi-monthly.

FOUNDER'S DAY.

On the second Thursday of October of each year Commemorative Exercises are held in honor of the Founder of the University.

On Thursday, October 13th, 1881, the third celebration of Founder's Day occurred. In Packer Hall, a service, appropriate to the occasion was held and a Memorial Address was delivered by the Hon. Samuel J. Randall of Pennsylvania. In the afternoon the Annual Sports of the University Athletic Association took place in the new Athletic Grounds.

WASHINGTON'S BIRTHDAY.

This day is observed as a holiday and is usually celebrated by the students in an appropriate manner.

On Tuesday, February 22d, 1881, exercises were held in the chapel. Washington's farewell address was read by John Dougherty Ruff and an oration was delivered by Charles Comstock Hopkins of the Junior Class and there was vocal music by the University Glee Club.

THE UNIVERSITY SERMON.

This sermon is preached on the Sunday before University Day.

The Rev. Geo. Leeds, D.D., was the preacher on Sunday, June 19th, 1881, in the University Chapel.

THESIS DAY.

On the day preceding University Day, the Theses prepared by the graduating class are publicly read.

THESES OF THE CLASS OF 1881.

The Mears Gold Chlorination Process.
WILLIAM SIMON CRANZ.

Mary Tudor and Thomas Cranmer.
ALEXANDER PATRICK CRILLY.

Review of Blowing Engine No. 5, at the Thomas Iron Company's Furnaces in Hokendauqua.
THOMAS MORGAN EYNON, JR.

On the Nature of the Gases found in the Anthracite Coal Mines.
CHARLES WEED GRAY.

Estimate of Macaulay as a Historian.
LEWIS STOCKTON.

THE ADDRESS BEFORE THE ALUMNI

Is delivered on the evening of Thesis Day.

Hon. A. K. McClure, of Philadelphia delivered the address on the evening of June 22d, 1881, in the large Drawing Room of Packer Hall.

UNIVERSITY DAY.

This day is the last of the academic year and falls on the fourth Thursday in June. The exercises consist of orations and essays by members of the Senior Class.

EXERCISES ON JUNE 23d, 1881:

Reading of Scripture and Prayer by the Right Rev. M. A. De Wolfe Howe, D.D., LL.D., Bishop of the Diocese.

Salutatory Oration.
BENJAMIN FRANKLIN HALDEMAN.

Oration—The Study of the Sciences.
WILLIAM SIMON CRANZ.

Oration—The Coming Man.
ALEXANDER PATRICK CRILLY.

Essay—The Growth of the Locomotive.
THOMAS MORGAN EYNON, JR.

Oration—The field of Industrial Chemistry.
CHARLES WEED GRAY.

Valedictory Oration.
LEWIS STOCKTON.

Award of the Wilbur scholarship to Preston Albert Lambert, Seidersville, first in rank in the Sophomore Class.

The following Degrees were conferred:

A.C. upon William Simon Cranz, Akron, O.
B.A. upon Alexander Patrick Crilly, Allentown.
M.E. upon Thomas Morgan Eynon, Jr., South Bethlehem.
A.C. upon Charles Weed Gray, New York City.
E.M. upon Benjamin Franklin Haldeman, Philadelphia.
B.A. upon Lewis Stockton, Phœnixville.

The Benediction was then pronounced by the Bishop.

The music upon Thesis Day and University Day was by Hassler's Orchestra.

THE WILBUR SCHOLARSHIP.

This scholarship was founded in 1872 by E. P. Wilbur, Esq., of South Bethlehem, and is the sum of $200, awarded annually to the student in the Sophomore Class having the best record.

ALUMNI ASSOCIATION

OF

THE LEHIGH UNIVERSITY.

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1881—82.

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Charles L. Taylor, Philadelphia, Pa.

VICE PRESIDENTS:

W. D. Hartshorne, Lawrence, Mass.
H. F. J. Porter, Trenton, N. J.

SECRETARY AND TREASURER:

Arthur E. Meaker, Bethlehem, Pa.

ALUMNI TRUSTEES:

L. E. Klotz, Mauch Chunk, Pa.
W. H. Baker, Philadelphia, Pa.
(Term expires June, 1882.)
Wm. R. Butler, Mauch Chunk, Pa.
W. D. Hartshorne, Lawrence, Mass.
(Term expires June, 1883.)

EXECUTIVE COMMITTEE:

Charles L. Taylor, *Chairman.*
Arthur E. Meaker, W. H. Baker,
L. E. Klotz, W. R. Butler,
W. D. Hartshorne.

MEMBERS.

CLASS OF 1869.

J. H. H. Corbin, A.C., Chemist, Alamosa, Col.

Charles E. Ronaldson, M.E., Mechanical Engineer, Siemen's Regenerative Gas Furnace, 119 South Fourth Street, Philadelphia.

Miles Rock, C.E, Astronomer, U. S. Naval Observatory, 1432 Chapin Street, College Hill, Washington, D. C.

CLASS OF 1870.

* L. Preston Ashmead, A.C., M.D.

R. Brodhead, M.E., Attorney-at-Law, Easton, Pa.

William R. Butler, M.E., Bookkeeper, First National Bank, Mauch Chunk, Pa.

George A. Jenkins, A.C., Bethlehem Iron Co., Bethlehem, Pa.

William J. Kerr, A.C., 2037 Mount Vernon Street, Philadelphia.

Harry E. Packer, A.C., Vice President Lehigh Valley Railroad, Mauch Chunk, Pa.

Henry B. Reed, B.A., M.D., Practicing Physician, 2300 Delancey Place, Philadelphia.

William D. Ronaldson, B.A., M.D., Practicing Physician, Longdale, Allegheny Co., Va.

John M. Thome, C.E. Astronomer, Astronomical Observatory, Cordova, Argentine Republic.

* Russel B. Yates, C. E.

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Waldron Shapleigh, A.C., Superintendent Kings Manufacturing Company, Freeport, Ill.

* C. G. Weaver, C.E.

* Deceased.

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Harvey S. Housekeeper, B.A., Superintendent High School, South Bethlehem, Pa.

L. E. Klotz, C.E., Robert Klotz & Son, Mauch Chunk, Pa.

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H. B. de Miranda, A.C., Professor of English, College of Para, Para. Brazil.

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W. D. Hartshorne, Chemist, Arlington Mills, Lawrence, Mass.

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J. J. da Gama Malcher, M.E., Naval Officer, Custom House, Para, Brazil.

W. P. Rice, C.E., Assistant to U. S. Engineer, Cleveland, Ohio.

Henry Richards, E.M., Mining Engineer, Trabo Mine, Dover, N. J.

L. W. Richards, M.E., Vulcan Iron Co., St Louis, Mo.

Charles L. Taylor, E.M., Pittsburgh Bessemer Steel Co., (limited) Pittsburgh, Pa.

* Deceased.

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James F. Marsteller, C.E.,
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Alexander Patrick Crilly, A.B., Allentown, Pa.
Thomas Morgan Eynon, Jr., Crystal City Plate Glass Co., Crystal City, Mo.
Charles Weed Gray, A.C., New York City.
Benjamin Franklin Haldeman, E M., Philadelphia, Pa.
Lewis Stockton, A.B., Ulrich's Preparatory School, South Bethlehem, Pa.

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American Journal of Mathematics. Vols. 1 and 2.

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Congressional Globe. 58 Vols.
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Medical Satistics of U. S. Army. 1855–59.
Statistics U. S. Census. 1850.
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Penna. Senate Journal. 1861, '63.
Penna. Legislative Record. 1864, '81
Scattered Notes on the Text of Shakspeare, by J. G. Herr.
Annual Report of the State Lunatic Hospital, Penna. 1880 and 1881.
In Memoriam, D. M. Jones, Harry O'Neill and James Newell.
In Memoriam, Dr. R. R. Reed.
University of Pennsylvania Law Department; Announcement. 1881–'82.

From Second Geological Survey of Pennsylvania.

Reports G_4, H_5, I_3, P Text, R, A_2, G_5, H_6, M_3, Q_4, T.

From Hon. J. M. Forster, Harrisburg.

Eighth Penna. Fire Insurance Report.

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Report on the Banks of Penna. 1880.
Report of the Auditor General of Penna. 1878.

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From the Trustees of the Public Library, New Bedford, Mass.

Twenty-ninth Annual Report.

From U. S. Treasury Department, Washington, D. C.

Report of Supt. of Coast Survey. 1877.
The Public Indebtedness of Foreign Governments.
Annual Report of the Secretary for 1881.

From U. S. War Department, Washington, D. C.

Official Army Register. 1881.

From U. S. Naval Observatory, Washington, D. C.

Reports on Total Solar Eclipses. 1878, 1880.
Variable Stars of Short Period. Pickering.
Longitude of Cincinnati Observatory. Eastmann.
Solar Eclipse of 1878. Stone.
Washington Astronomical and Meteorological Observations. 1876. Parts 1 and 2.
Subject Index of Publications of the U. S. Naval Observatory. 1845–1875.

From the U. S. Department of the Interior.

Report of the Commissioner of Education. 1878, 1879.
Circulars of Information of Bureau of Education. 1880 and '81.
Discipline of the School.
Education and Crime.

Fifty years of Freedom in Belgium.
Second Report of U. S. Entomological Commission.
43 Volumes Congressional Documents.

From the Smithsonian Institution, Washington, D. C.

Annual Reports. 1878, 1879.
Contributions to knowledge. Vol. 23.
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Seventh Annual Report of the Survey of the Adirondack Wilderness, by V. Calvin.

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Phila. Directory. 1868, 1875.
N. Y. Directory. 1873.
28 "Nations."

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Journal of the General Convention of the Protestant Episcopal Church. 1880.

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Methods and Results.

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U. S. Agricultural Report. 1879.
Contagious Diseases of Swine and other Animals.
Report of the Director of the Mint. 1880.
Report on Total Solar Eclipses.
War of the Rebellion. Vols. 1 and 2.
Report U. S. Centennial Commission. 9 Vols.
Smithsonian Report. 1879.
Commerce and Navigation. 1880.
Reports of Department of State. 1880 and 1881.
Report of Chief Signal Officer. 1879.
Engineers Report. Parts 1–3.
North American Ethnology. Powel, Vol 4.
Congressional Record.

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Heliotype View of Bethlehem in 1757, and frame.

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Catalogue of Greek and Roman Coins of Yale College.

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Journal of Grand Lodge of Illinois. 1880.

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Semi-Centenary of Grace Church, Parish.
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Penna. Report of Board of Public Charities. 1880.
Penna. Second Geological Survey. Vols. P. H_5, T, G. H, Q_4, H_6, CC. C, A_2.
Agriculture of Pennsylvania. 1880.
Annual Report of Supt. Soldiers' Orphans. 1880.
Bank Report. 1880.
Eighth Penna. Fire and Marine Insurance Report. 1880.
Obituary Addresses on Senator Wm. Elliott.
Obituary Addresses on Senator Geo. D. Jackson.
Obituary Addresses on Senator Chas. H. Paulson.
Legislative Directory. 1881.

Proceedings on the Death of Bayard Taylor.
Reports on the Grand Water Ways of Penna.
Northern and Western Boundary Commissioners' Report.
Statement of Accounts and Expenditures of Penna. 1874–'80.
General Laws. 1881.

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"Bethlehem Daily Times."
"Evening Telegraph," Philadelphia.
"The Moravian."
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"Catasauqua Dispatch."
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"The Iron Age."
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42 lbs. Spelter.

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